ELECTRICAL WEST

WITH WHICH IS CONSOLIDATED
THE JOURNAL OF ELECTRICITY

A McGraw-Hill Publication | JUNE 1, 1931 | Twenty-five Cents per Copy

TOWERS
for the
Mokelumne River Line

The recently completed Mokelumne River Line of the Pacific Gas and Electric Company transmits power from the Mokelumne River hydroelectric plants to Newark substation. This is a 220-kv., double-circuit line. In the mountains and foothills, single-circuit snow-type towers are used; in the lowlands, the towers are of the double-circuit type, as shown at the right. All of the towers in this 127-mile line were manufactured by Pacific Coast Steel Corporation.

Pacific Coast Steel Corporation with its organization and broadly-experienced engineering department, is equipped and ready to cooperate in the design of steel transmission structures to meet any condition.

The three towers shown in the group to the right are special crossing towers at the San Joaquin River. One is on the Mokelumne line, and the other two on the Wise and Standard lines of the Pacific Gas and Electric Company.

All towers on these lines were manufactured by the Pacific Coast Steel Corporation.

PACIFIC COAST STEEL CORPORATION
Subsidiary of Bethlehem Steel Corporation
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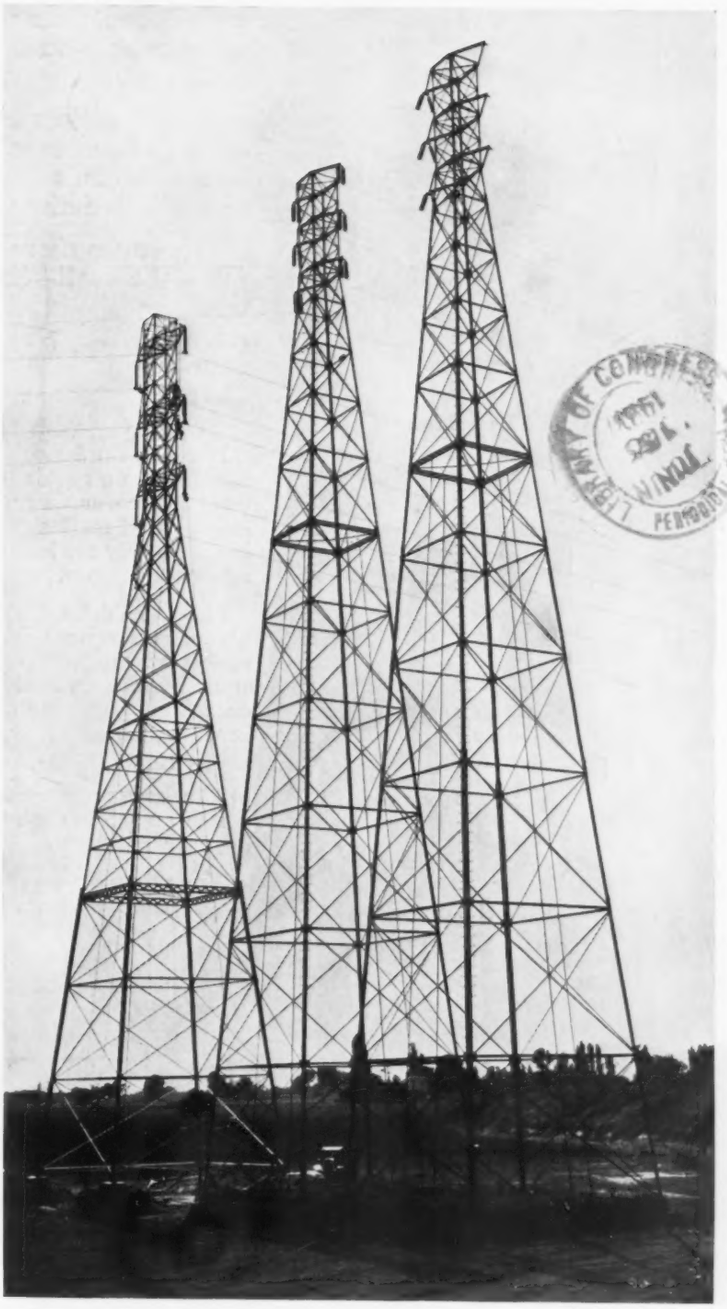


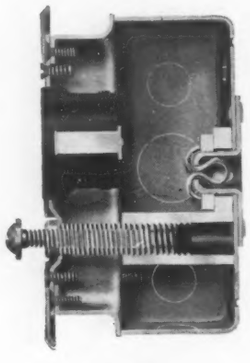
These Fan Hanger Outlets will help you sell fans

No. 649
Stud Lock Type

RUSSELL & STOLL fan hanger outlets are designed to "fit the job." They do that—and more. They help sell an installation, save the time of the contractor, bring more and more repeat business. They translate goodwill into better profit.

"R&S" outlets are rigidly constructed and immune to the effects of constant vibration. They are installed and wired before the finish wall is applied; finishing plates are secured and adjusted after the final wall decorating.

Wherever there is a need to suspend an electrical device from the wall—individual illumination for pictures, radio loud speakers, electric clocks and heaters — specify RUSSELL & STOLL fan hanger outlets. They will build your business.



Sectional View

No. 649, Stud Lock Type outlet is installed with a specially constructed steel box and cover. Permanent rigidity of assembly of malleable iron stud and box is assured by the lock nut and additional cotter safety pin.

No. 661, Yoke Lock Type outlet fits a standard square box and cover with raised rectangular opening and is installed with standard materials throughout. Two point support is secured by a brass toggle and a malleable iron yoke.

In both, supporting straps are welded to the heavy gage cadmium steel plate which supports the receptacle, preventing loosening.

Your jobber can supply these and other "R&S" fittings.

No. 661
Rear View
Showing Yoke Lock Type
Mounted on Cover

RUSSELL & STOLL COMPANY

H. M. THOMAS CO.
163 2nd Street
San Francisco, Calif.

53 Rose Street, New York, N. Y.

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912 E. 3rd Street
Los Angeles, Calif.

"FITTINGS THAT FIT THE JOB"

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So it took the 7500 amperes

A line of the Gary Heat, Light and Water Company, struck by lightning, suffered a flashover calculated at 7500 amperes or more. The conductor burned down.

Of the Lapp No. 5842 Fog Type Insulators on the line two were flashed. One is shown in this unretouched photograph. Both Insulators, after test, proved sound electrically—and sound mechanically except where the glaze was melted off. Both, if put back into service, would probably have endured indefinitely.

This stability is typical of Lapp Fog Type Insulators. The short, sturdy petticoats don't rip away. They withstand an unusual amount of thermal punishment. Even if unexpectedly severe arcing should destroy one or more petticoats, the original efficiency, only slightly reduced, will hold the line in service. Rocks and bullets find Lapp Fog Type Insulators equally resistant.

Lapp Fog Type Insulators are always better and for several voltages actually less expensive.

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LOS ANGELES SAN FRANCISCO SEATTLE

LAPP INSULATORS

ELECTRICAL WEST

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G. C. TENNEY, *Editor*

HOPES of Arizona to prove the Boulder Canyon Project Act unconstitutional were overridden when the United States Supreme Court dismissed its suit in a recent decision. Thus Arizona's efforts to frustrate construction of Boulder Dam have come to naught. At some later date, probably after the project is completed, Arizona plans another suit, this time to prove that an injustice has been done and to seek damages therefor.

BRAWLEY (Calif.) voters were so exercised over a municipal plant issue, which they defeated decisively, that they turned down important water and health measures as well.

SEATTLE'S new light superintendent has been approved by its council after the mayor successively recommended five candidates. Finally compromise was reached on number two.

WINNERS in the West's speaking contests, a man from Colorado, and a woman from California, go East to match tongues with the best the nation has to offer.

DRAMATIZED in the best Hollywood manner, the program of the P.C.E.A. convention will tell the messages of the industry with double emphasis—visual as well as audible.

NATURE reversed herself in bestowing rainfall to the Pacific Coast. Thus the usually moist central region finds itself dry, while northern and southern extremes appear better supplied.

LAST year every ball park blossomed with night lighting. San Francisco's new stadium learned from them all and installed lighting of unusual effectiveness.

The Month

STRATEGY is important to large-scale operations, as one company demonstrates in its sales drive on the oil industry, many years serenely indifferent to outside power sources.

TINSMITH and light combined to make a new night club the most "different" yet built. (See page 600.)

OTHERWISE idle hydro units, with only a relatively small flow of water through them, can act to boost voltage when peak demands are made on an interconnected system. An exceedingly capable woman engineer proves the case. (See page 615.)

CO-OPERATION goes the limit in one company's new merchandising set-up, already operating. (See page 609.)

LEAGUES serve business building purposes, but Utah's specializes on light, with excellent results to all branches of the industry. (See page 602.)

EVEN the brick plant can have straight-line production with electrical machinery correctly engineered to assist it. (See page 618.)

REFRIGERATION surpasses daily quotas where all interests unite in telling and selling the health and food preservation idea.

Editorial

Clip the Coupons On the Convention

EVER since business started making its general retreat from Moscow, all the swords have been beaten into razor blades with which to shave from operating expenses anything even faintly suggestive of a frill. Consequently, it is natural enough that attendance at conventions should become fair game for a big slice. It is natural enough, but is it wise? Any form of economy program is natural, but some can hardly be called sensible.

If ever there is a time when the generals should call together the troops, stand them up at attention and inject into them heavy doses of morale, it is at the moment they are ready to break and run.

By that token it would be the greatest wisdom (though it is the height of improbability), to make arrangements to send every man and woman who could be spared from the actual work of operation to the Pacific Coast Electric Association convention. Either that, or make it possible to take the convention to every employee, every contractor, every dealer, everyone in the industry.

The electrical industry already has invested in this convention the time, thought, and labor of hundreds of its most capable men and women, the money already expended in furthering committee work and research, plus intangibles in the way of potential business assets, the value of which cannot be estimated. And the only way in which it can clip its dividend coupons is in the attendance at the convention of its people, those who must put all the association's results to work. Certainly it will be entirely natural if executives allow the alibi of economy to dissuade them from sending many of their people, including themselves, to the convention. But will it be wise?

Unify Regulations For Oil Field Load

SOMETIMES it takes an outsider to draw attention to the obvious. Oil field power service regulations on the part of the various utilities are a case in point. It was the oil industry itself, operating fields and plants in territories of different companies, that drew attention to the variety and inconsistency of divergent regulations in their various fields of operation.

Anxious to develop oil field load, one of the most constructive pieces of work accomplished this year by the oil field electrification committee of the P.C.E.A. has been the work tending to unify such regulations. This fact naturally gives rise to the question of whether there may not be other types of industrial customers who suffer from the lack of uniformity of rules because their operations extend beyond the boundaries of any one company. A constructive piece of work for business at large could be accomplished in this respect.

"To Be or Not to Be"

THESE be days when central station executives do a good deal of Hamlet soliloquizing over the merchandising of appliances. Garbed in black robes of economic somberness, there is much pacing to and fro and striking of tragic poses.

"To merchandise, or not to merchandise, that is the question. Whether it is nobler in the end to suffer the slings and arrows of outraged merchants, or to take up arms against a sea of protests, and by opposing, end them."

The dilemma runs true to pattern thus far. But enough of these thoughts of merchandising and load-building suicide! The industry must not allow itself to sink into a slough of despondency which can mean only stagnation and decay. The indecisive stage Hamlets are interesting only as examples of futility to be avoided at all cost by normal, healthy people or industries.

Merchandising is not hopeless. Even utilities may indulge in the practice. Not only may they merchandise, but they have an unavoidable responsibility to the industry at large to merchandise, and to do so aggressively, persistently, ceaselessly, yet withal fairly and squarely. It can be done in such a way that the dealer may participate. The utilities should all be hard at it now, stimulating markets which the ordinary channels of trade scarcely even touch. Any clear-thinking dealer will concede the value to himself of this stirring up of sluggish markets, from which he, too, can get more business.

Manufacturers, also, would do well to cease assuming the role of ghost. If it can be said of the merchandising situation that "something is rotten in the State of Denmark," the responsibility certainly is not all upon the central stations. Undoubtedly it has been easier for manufacturers to distribute through the one large outlet and to allow

that outlet to carry the largest share of the burden of promotional pioneering. Some introspection of a more healthy sort than Hamlet's might assist the solution of this trying problem along another front.

After all, what the public wants to see in this drama is not a number of corpses gloomily bedecking the scene. It would prefer a happy ending, wherein all the differences which made up the plot and the counterplot, the struggle and the strife of the drama, are brought to mutual understanding and peace. What it desires is comfortable living. If electricity can provide that without tripping over itself in doing so, the public will buy electricity.

Regulation Should Not Invade the Field of Management

IN ESTABLISHING interim rates which grant agricultural power consumers of the San Joaquin Light & Power Corporation a 20 per cent discount for the duration of the current pumping season so as to alleviate their present distressed economic condition, did the California Railroad Commission exceed the bounds of its authority and jurisdiction? A review of facts pertinent to this and other cases seems to call for an affirmation.

Under the terms of the law, a utility regulatory body is vested with certain legislative and administrative powers, legislative in determining whether the price at which service is offered is both reasonable and just, and administrative in determining how the operations of the companies shall be carried on so that legislative regulations can be made effective. A commission's regulatory functions are discharged when it guarantees to the public adequate service at the lowest rates that will return to the utilities reasonable operating expenses, including taxes and depreciation and, at the same time, produce a fair return upon the fair value of the utility property used and useful in providing this service. Deviation from this definition represents an invasion of fields reserved for the utilities.

In determining that consumers of the San Joaquin company were entitled to a reduction in rates, the commission undoubtedly acted within its rights, but it did not make a new discovery in finding that in the case of the farmer an emergency existed which warranted special consideration. Congress has been of the same opinion for two years. In granting to the farmer an emergency interim reduction the commission overstepped its bounds and usurped a right that is reserved to management. Such an act might be characterized as a raid for charitable purposes cloaked in the guise of farm relief. If, in the opinion of the management of the utility, the farmer needed relief and the entire business of the utility depended upon his receiving this relief, then a voluntary reduction which the commission itself would ratify might have been in order. As matters stand at the present time, the commission has placed its approval upon a type of discrimination which regulation was designed to overcome.

Such action by utility commissions can do but one thing—it will cast further opprobrium upon regulation itself at a time when the theory of regulation is already in disrepute with the public.

1931 Is a Refrigeration Year

LIKE a ray of sunshine piercing banked storm clouds is the 1931 record of electrical refrigeration. The smiles and jeers which greeted January's statement that 1931 would be a refrigeration year have been replaced by wonder and envy. From all parts of the country, and particularly from the Pacific Coast states, come reports that refrigerator sales are far ahead of quotas and are exceeding 1930 results by 30 to 75 per cent.

Some will wonder why, in this period of "depression," with public buying at low ebb, such a device as an electric refrigerator with a sales price ranging between $200 and $500 has captured public fancy. The answer is not hard to find. And in it is a moral for the entire electrical industry.

In the first place, four years of determined and aggressive advertising, sales promotional and educational activities, are this year bearing fruit. The electric refrigerator is no longer a luxury but is now a highly desirable economic necessity in the home. The buying public today is looking for values. It is buying only those things which will save money. And it is accepting the refrigeration industry's statement that an investment in an electric refrigerator pays its own way.

Perhaps most important of all is the attitude of the refrigeration industry itself. It will not accept defeat. Instead of curtailing advertising, it is increasing its appropriations; instead of reducing sales forces, it is hiring every good salesman that can be found. Morale is high, enthusiasm at a maximum. Such aggressiveness can accomplish only one result—more and more sales.

All of this leads to one final question: What if the same sales promotion, sales effort and enthusiasm were put behind electric ranges, ironers, or any and all of the other appliances? The electric refrigeration branch of the industry is giving the other branches a demonstration of real selling and merchandising. May the lesson be profitable!

Utility Centers Advertising Effort on Load Building in Single Industry

Concentration of Advertising Literature and Sales Effort to Further Electrification of Oil Industry Tends to Derive Maximum Results From Load Growth Program

PROGRESS, measured from the utility viewpoint, is the proportionate increase in the consumption of electrical energy. Fortunately, load building has been a problem which offered a variety of methods of attack so that manufacturers, contractors, dealers, and power companies, each conducting campaigns suited to their particular requirements, have co-operated in an intensive educational crusade using the convenience, cleanliness, and economy of electricity as weapons to combat public reluctance to accept new ideas and methods. Figures showing the national load growth from 32 billion kw.-hr. in 1920 to 76 billion kw.-hr. in 1930 attest the success attending these efforts and should be the stimulation for increased activity in this important phase of the industry.

Contributing to this achievement, in a large degree, are the energetic efforts of the power companies located, figuratively speaking, on the front line and using increased system load as the yardstick for the measuring of their accomplishments. Methods of increasing the load density in the territory served by their lines vary with each company, but the systems can be resolved into three lines of attack.

The first of these is the education of the general public, and particularly consumers, in the advantages of electricity, this being accomplished by advertising stressing the convenience and economy of the service. A second method is the aggressive campaign to secure more load through exploiting certain lines of load-building appliances and apparatus, this being accomplished by personal contact, circularizing a definite mailing list of prospective consumers with pamphlets and pertinent literature, and judicious billboard and newspaper advertising.

At the present time practically every load-building program, whether concentrating on refrigerators or industrial heating, is some modification of one of the two foregoing plans. Because of the wide field of any program built up on this basis, its inherent weakness is the difficulty of securing the concentration of effort necessary to produce the maximum results without a large sales staff or prohibitive advertising expenditure. The figures on load growth definitely show that satisfactory results have been and can be obtained with this system, but, believing that its efficiency could be increased further by more intense concentration, the San Joaquin Light & Power Corporation has devised a third method promising results which may justify a wider application of the idea.

In common with many other Western utilities, the company serves a region in which agriculture is the dominant industry and one in which electric energy plays a prominent part in crop production. A few years ago successful oil prospecting in Kern County, and later in Kettleman Hills, opened up another industry which threatens to compete with agriculture in importance. Large amounts of power are required for the drilling, pumping, transporting, and refining of oil, but because electrical power sources were not generally available in new fields, steam has been used with more or less success as a source of energy. Up to the present time this wide use of steam has developed a definite inertia against the change from steam to electric power. Naturally, difficulties had to be overcome before the electrification of the industry could be carried out to any great extent, but the San Joaquin Light & Power Corporation has done an excellent piece of salesmanship by bringing approxi-

mately 56,000 hp. of oil-field equipment on their lines, 90 per cent of which is drilling and producing equipment. These figures represent about 40 per cent of the estimated available load, and economy resulting from the use of electric power forms the basis of this special effort to electrify the oil industry.

As a further step in the electrification program, a series of bulletins was prepared to carry the message to the personnel of the oil industry. These bulletins, illustrated herewith, are being periodically mailed out to the members of oil companies operating in the districts, new companies formed, and supply houses, forming a series of individual announcements of the advantages to be derived from the use of electric power. The first bulletin outlines the facilities of the power company in the oil fields and its ability to render complete electrical service. Following this, the various phases of oil field operation such as drilling, transporting, gathering, etc., are treated successively from the electrical standpoint. Each announcement carries pictures of the actual operating installations which are pertinent to the subject matter and which are effecting economies for their owners by utilizing the company's service. The subject matter of each is brief and treats only certain phases of the oil industry. Eight such announcements were required to cover the industry comprehensively from an operator's viewpoint.

At the completion of the series the power salesmen of the company, by personal contact, will elaborate on the various features stressed in the bulletin. To assist their efforts a neatly bound prospectus was prepared which contains detailed electric cost information on the various operations in the oil industry. For superintendents and drillers a complete tabulation of a representative group of electrically drilled wells was made up in which were included figures giving power consumption, speed of drilling, and cost per foot. This tabulation was expanded to include comparison between wells using electric energy for drilling only and wells using power for drilling, lighting, and other services. Further expansion developed a comparison between the cost per foot for drilling with electricity in various fields. The figures show costs as low as 15 cents per foot for electric drilling.

The pumping and transporting of oil on a cost per barrel basis were compared under varying conditions and again showed that appreciable savings were possible by using electricity. Lighting recommendations for derricks were also included to make complete the survey of the producing end of the oil industry.

An entree having been established by means of the circulars, the power salesman of the company, armed with the carefully prepared information in the survey, is given an ideal approach to the prospective user of energy. Photographs of actual installations on the circulars are potent means of stimulating the prospect's mind into a receptive mood to discuss new methods that might be better than those which he is using. Tactfully presenting his story and supplying actual operating figures from the survey, the salesman has an excellent opportunity to dissipate whatever prejudice the prospect may have against the use of electricity in his operations. Further contributing to the success of the sales effort is the variety in the angles of attack. Certain of the processes in the operations under consideration will lend themselves more readily to electrification than others. In one well, water pumping might be the feature which would show an economy under electric operation; in another, drilling or pumping; or, lacking these, adequate illumination for night operation is a reliable opening wedge for the eventual complete electrification of the operations.

Regardless of its value to the power company, this thorough cost analysis of operation, compiled from careful records and reported in engineering technique, unquestionably is of great value to the oil companies. Even the most prejudiced proponent of steam cannot help being impressed by the savings demonstrated by electric operation. In any event, the time and effort expended by the utility in preparing this analysis has resulted in a potent medium through which to obtain increased load from the industry.

With recent improvements in deep-well drilling, new depths have been made possible and new deposits have been uncovered. The oil obtained from the lower depths is much lighter than the heavy product of the upper strata, making it unnecessary to heat this oil at various points for efficient pipe-line transportation. This has eliminated a strong argument in favor of the steam installation for pipe-line power.

Through proper education regarding economies, automatic control, convenience, and reliability of service, electricity will undoubtedly become the leading prime mover in the transportation of this lighter oil through pipe lines in the San Joaquin Valley.

From the potential market for power outlined above, the San Joaquin Light & Power Corporation confidently expects to add 6,000 hp. to its lines during the current year. Narrowing the field of concentrated advertising activity to a single industry departs from the accepted method of utility advertising, but the results of the idea merit close attention by other operating companies to the end of applying a similar set-up for specific load-building problems in their territories. By the explicit presentation of a message outlining new methods whereby appreciable operating economies may be obtained, this company has opened a large potential field for future growth, as well as building up the good-will necessary for achieving its goal.

Lighting Scores In Seals Stadium

This Installation at San Francisco, Said to Be the Best of All Ball Parks, Illustrates Modern Technique in High Intensity Illumination of Large Areas—With Electric Scoreboard and Public Address System, Individual Secondary Distribution to Each Light Source Location, and Many Other Features

By R. A. HUDSON

Hunter and Hudson, Consulting Engineers,
San Francisco

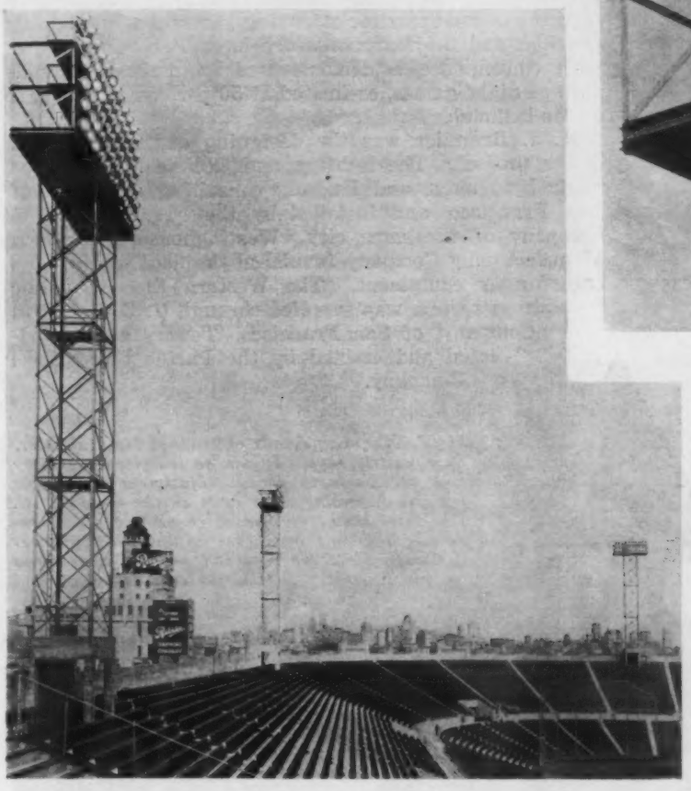
DAYLIGHT brilliance would not be an exaggerated superlative for describing the conditions under which night baseball is played at the new Seals Stadium in San Francisco. This new concrete structure encloses one of the largest baseball fields in the country, an entire 600-ft. block being devoted to the stadium and parking area. Its completion marks a new era in night sports for, contrary to past practice, provision for proper floodlighting was a paramount consideration in the design and construction of this sports theater.

Features of the floodlighting installation should be of paramount interest, for the playing field is reported to have a higher intensity than any other baseball diamond in the world. A total of 308 floodlighting projectors are installed, the units being of 1,000-watt capacity. The arrangement and concentration of these units produce an illumination spectacular in its reproduction of mid-day brilliancy on the playing field. Minimizing the number of light source locations aids in reproducing daylight conditions. With six locations, so positioned that the ball would never be between the light source and the players' eyes in normal play, it was possible to illuminate the playing area to the desired intensity. At the selected location an appropriately grouped battery of floodlighting projectors is mounted on a 120-ft. structural steel tower. Two of these towers, each mounting 32 floodlighting units and located opposite a point 30 ft. to the right and left of home plate, concentrate their rays on the infield; two towers, each mounting 72 floodlighting projectors, are mounted opposite to a point 260 ft. to the right and left of home plate; and the third pair of towers, each mounting 50 floodlighting projectors, are placed at the right and left field fence line, respectively. The light from the latter four towers is arranged to spread evenly over the entire field, giving a uniform illumination of 30 foot-candles. Illumination on the infield is supplemented by the first mentioned pair of towers to produce approximately 50 foot-candles there, certain units being so concentrated as to produce an even higher intensity than this on the ball as it travels between the pitcher and catcher.

Accompanying illustrations show the method of arranging the batteries of projectors. Each projector is connected to the source of power through a Russell & Stoll weatherproof receptacle. Mounting and installing the projectors departed from the conventional practice, each projector being completely assembled on the ground with the lamp in place and cord and plug attached. Each unit assembly was then focused in a dark room under the grandstand, hoisted into position, and bolted on the angle-iron sill in the face of the tower. The field had been laid off according to a predetermined plan so that, with a special sighting arrangement, the lamps could be pointed and set in the daylight. So successful was this scheme that only four lamps on each of the grandstand towers required re-adjusting from their original setting.

Intimate details of the play can be seen from the highest point on the grandstand; more than 50 foot-candles intensity is produced between pitcher and batter. Electric scoreboard may be seen between the two towers in center field

Problems arising from serving widely separated, low-voltage concentrations of energy were solved in the following manner: Power is supplied through 3-phase, 4-wire service at 4,000 volts through the oil circuit breaker on the stadium switchboard. Rather than carry low voltage from the switchboard to the floodlighting towers, it was deemed more economical to carry a primary feeder from the switchboard to a transformer mounted at the projector bank 120 ft. above the field. One phase of the primary is so carried to each of two towers, thus completing the 3-phase circuit with a balanced load of two towers on each



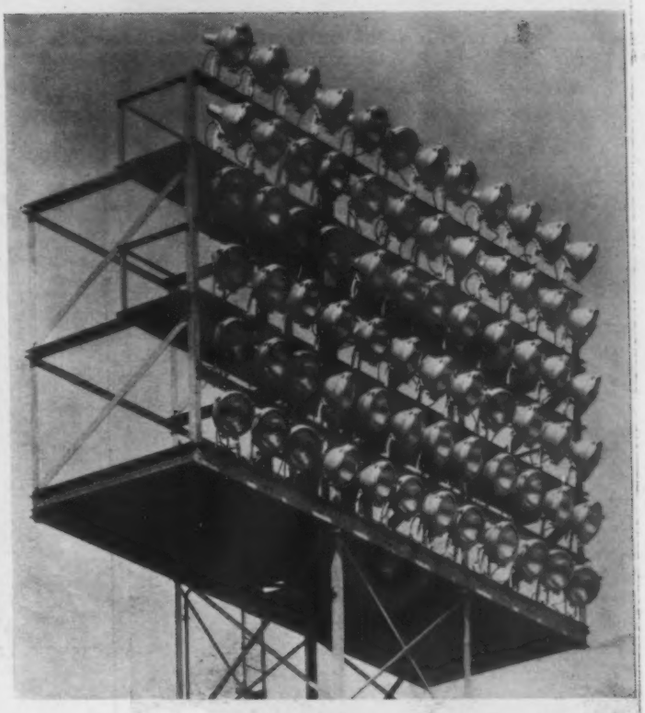


Fig. 1 (left). Three of the floodlighting towers illuminating new San Francisco baseball stadium. The mounting height of lowest row of units is 123 ft. above the field. Towers are of galvanized structural steel, the projectors being mounted on 4 x 4 x ¼-in. angle irons set in the face of the tower. Projectors are furnished without the customary trunnion base, but with the yoke, bolt, and wing-nut. After adjustment they are bolted through the angle iron and locknutted into place

Fig. 2 (above). Close-up of one of the six banks of floodlighting units. Note the individual concentration of each unit and the steep angle of throw obtained from the high mounting height. On the platform behind the lights is a transformer supplying the entire group through a three-wire 110/220-volt secondary distribution circuit

phase. The neutral is carried to the transformer on all the towers. In this manner each tower is supplied from its individual transformer and has an individual secondary distribution consisting of a 3-wire, single-phase, 220/110-volt feeder carried from the transformer through a distribution panel mounted adjacent to it, where the service is broken up into 4,000-watt, three-wire circuits of appropriate lengths to serve the projectors of that bank. No more than three lights are connected to a side of the 3-wire circuit, the entire secondary distribution being carried in conduit to the individual projector receptacles mentioned above. These receptacles are for the purpose of permitting repair or adjustment to any individual unit without impairing the efficiency of the other units on the circuit.

An interesting departure from standard practice is the burning of standard 115-volt, 1,000-watt lamps on 10 per cent excess voltage or on a 126-volt circuit. While this results in a 17 per cent increase in power consumption, the illumination is increased 39 per cent over the rated output of the lamp. This results in a shorter life of the lamp, but the additional lamp cost is more than offset by the reduced energy cost per light unit.

Mounting the light sources behind the stadium at a minimum height of 120 ft. permits a steep angle of throw which eliminates the necessity for louvers, visors, or control rings on the entire installation. This feature in turn insures that there will be no dark spots in the air for the ball to travel through. In addition, proper stippling of the projector lenses diffuses the light rays so that the ball is illuminated throughout its entire course no matter how high a "fly" is hit.

Further adding to the fans' enjoyment of the game is an illuminated scoreboard operated in conjunction with a public address system. Above the center field fence, a series of red or amber bullseyes are illuminated to inform the spectators of the pertinent facts of the play. These bullseyes are controlled from a group of toggle switches mounted in the press box directly behind home plate and operated by the scorer. At this same point is the con-

Fig. 3 (above). Main switchboard for the lighting installation. Three-phase, four-wire, 4,000-volt power is metered and controlled by the panel on the extreme right. Primary feeders at 2,300 volts are led directly to each floodlighting tower and controlled through the oil switch mounted on the center panel

trol for a standard Western Electric public address system. Here a microphone, connected through the necessary amplifying apparatus to eight loudspeakers mounted on the top of the scoreboard, permits comment on the play and offers a method of keeping the fans fully informed about the conditions of the game. Each bulls-eye on the scoreboard is illuminated by a 56-watt, 115-volt railway headlight lamp mounted in a cast aluminum housing. During daylight games the scoreboard is operated on a 120-volt circuit, while for night baseball this voltage is cut down through a step-down transformer to approximately 60 volts to eliminate the glare of the filament through the lenses.

These elaborate provisions for immediate and complete information on the play add greatly to the enjoyment of the spectators. That the baseball enthusiasts appreciate both the opportunity for attending games that night play provides and the features which have been installed for their convenience, is demonstrated by increased attendance at night games, estimated at 50 per cent by officials of the ball club.

H. J. Brunnier was the designing engineer for the entire project. The lighting and electrical layout was made by Hunter and Hudson, consulting engineers of San Francisco, and installed by the Frank J. Klimm Company of the same city. Westinghouse Electric & Manufacturing Company furnished the floodlighting and transformer equipment. The Western Electric public address system was supplied through C. C. Langevin Company, of San Francisco. Towers were fabricated and erected by the Pacific Coast Steel Company.

Fig. 4. Mounting details of floodlighting projectors. Each unit is supplied from an individual outdoor-type receptacle to permit adjustment and repair without disturbing other units on the same circuit. The inset shows method of connecting or disconnecting the unit by means of the plug-type receptacle. Note the neat and compact appearance of secondary distribution conduit layout

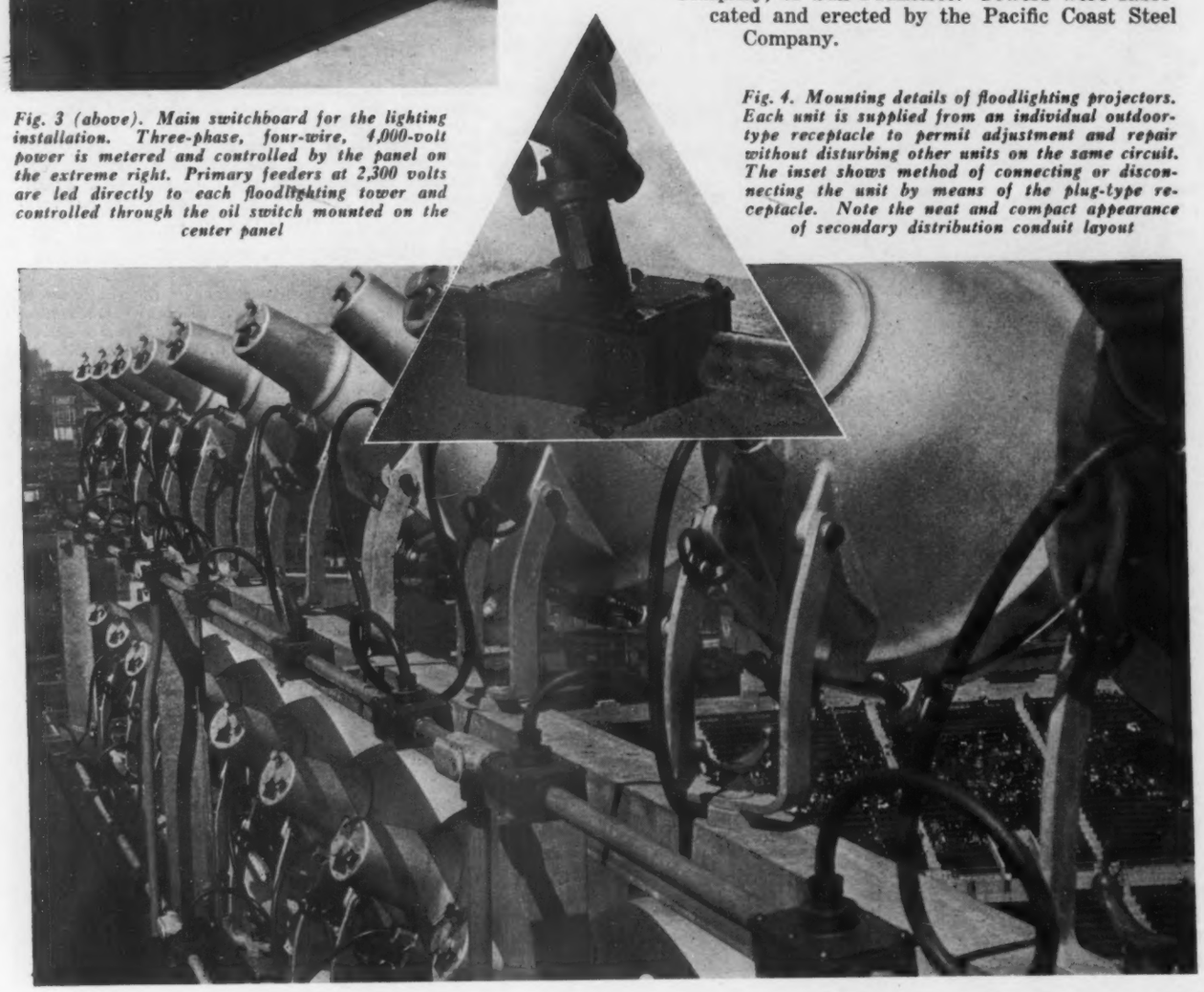


Fig. 5 (above). View of scoreboard and public address loud speakers

Fig. 6 (right). Tumbler switch control board for controlling scoreboard indications mounted in press box directly behind home plate. A microphone for the public address system, a phonographic reproducer and a radio set are also controlled from this point. Complete information regarding the game is furnished the spectators from this point

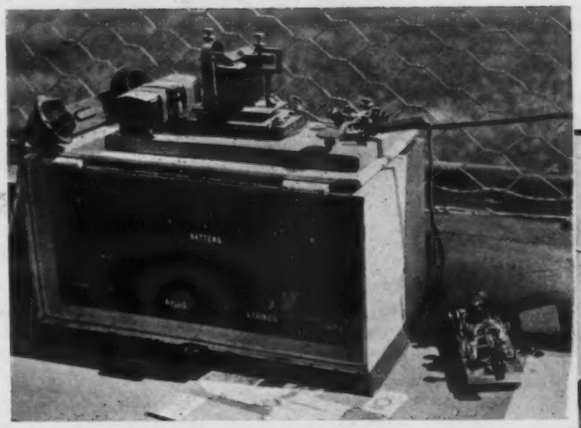


Fig. 7 (below). Rear view of cast aluminum housing of scoreboard indicating lamps. Each is individually connected by means of a cord and plug to the power and control circuits

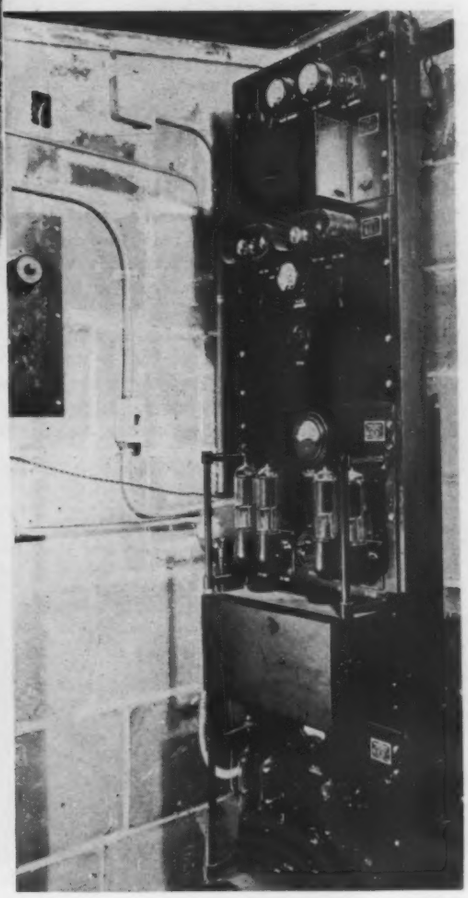
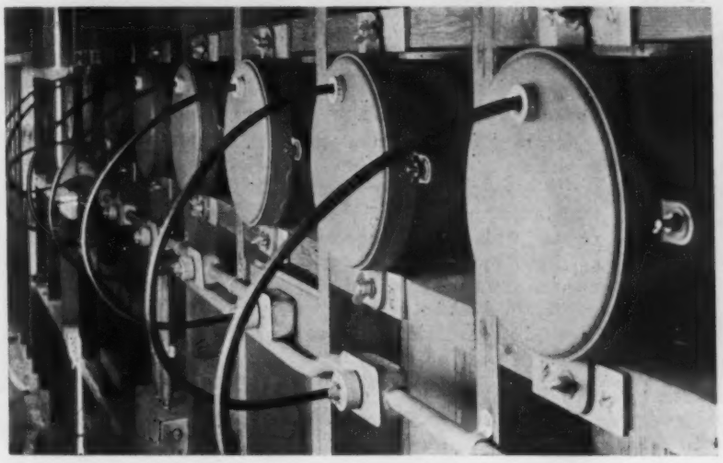


Fig. 8 (below). Power amplifier panel of the public address system. This is the standard unit which has been installed in all of the Pacific Coast League baseball parks. The public address system adds much to the enjoyment of the spectators by giving complete facts on the play



Must the Code Be Specific?

An Advocate of a "General Principle" Code Takes the Stand Upholding the Need for Greater Simplicity in Wiring Rules

TWO opposite viewpoints are held relating to the nature and administration of the National Code. Inspectors as a rule, hold to the point that for purposes of administration and discipline of their own inspectors' staff, as well as to limit endless controversy between themselves and the contractors or wiremen who must meet the rules, a specific code is essential. This means a specific designation of materials allowed, tables of wires and pipe sizes, and every possible contingency anticipated by a specific regulation.

On the other hand another group, notably some of the utility engineering departments, hold that a code of general principles, well written, will allow greater initiative and development of wiring.

In March a letter from James M. Evans, engineer for the Board of Fire Underwriters of the Pacific, and a staunch representative of the specific code idea, was printed in these columns. (See ELECTRICAL WEST, March, 1931, p. 139.) The following letter from the other side of the controversy was received in answer to Mr. Evans, but because of space assignment, could not be published sooner. It is an excellent statement of the position of the "general" advocates.

Editor, ELECTRICAL WEST.

DEAR SIR: The article "Should the Code be Specific or General?" by James M. Evans, in your March issue, is of good interest. It has happened that the ideas of those who advocate a "general" form for the code have often been advertised in the words of those who, like Mr. Evans, are apparently not very sympathetic toward these ideas; perhaps it would lead to a clearer understanding if the dissenters more often spoke for themselves. It would no doubt be a trespass upon your columns to undertake a full exposition of the case for those who believe that the present form of the code might be improved, but meanwhile it seems to this writer, as one of these, that Mr. Evans's own article provides illustrations of some of the main points at issue.

The article, perhaps ironically, suggests that most of Section 503q could be covered by a short paragraph, as follows:

> The total occupied area of a conduit shall not exceed 40 per cent space factor of the nominal or trade size internal area of such conduit. Except stage pocket or border circuits and elsewhere by specific permission where the 40 per cent space factor is the only limit, nor more than nine wires shall be installed in a conduit. Not more than six wires 225,000-circ.mil and larger shall be installed in a conduit. Not more than four wires 650,000-circ.mil and larger shall be installed in a conduit. Not more than two wires 1,900,000-circ.mil and larger shall be installed in a conduit.

As a matter of fact, it could be so covered, and most admirably, saving some minor correction and editing. But the real point is this, namely, that the present actual code text nowhere contains so succinct a statement, or any statement for that matter, of the general considerations governing the numbers of wires in conduits; that is to say, the fundamental general rule on the subject. What Section 503q does offer, in place of this definite statement, is an opportunity to guess that one can't put five 650,000-circ.mil conductors in any conduit of any size because a column of figures stops with the next line above, and so on. Further, at the very tail of the section, in a lowly fine print note, there does indeed appear the 40 per cent requirement, and a mere recommendation at that, for all the world as though it were an afterthought or a catch-all. This is, in part, what the advocates of a "general" code would like to see remedied.

Mr. Evans's next assumption, namely that everyone would have to make a table for himself, appears to me not to be justified. It is not only certain, but inevitable, that authentic tables, substantially like that on page 42 of the current code, would be freely available. It is not fundamentally important whether they should be within the same covers as the code; the important thing is that derivations of this kind shall not be the "canonical" part of the code, and, still more important, that they shall not be the canon itself. I do not know why the original drafters of the code saw fit to be so reticent about what they were really getting at, but this excellent example of Mr. Evans can be matched scores of times throughout the code.

The code is actually based upon principles or "canons"; the trick is to find them and distinguish them from the subsidiary rules which are really only a means of applying the general principles. Some of us think that the difficulty comes about when those who use the code daily, particularly those electrical Fundamentalists to whom it is indeed the *Wiremen's Bible*, confuse the subsidiary rules with the principles and apply them as though they were principles. Those who advocate a "general" form of code believe that the general principles should be isolated and clearly stated and then followed where necessary by details of application; they believe this treatment will prove that many detailed requirements are unnecessary and that they have existed merely on account of obscurities in the conventional form of the code.

Perhaps it is not fair to raise the next point at Mr. Evans's expense, for undoubtedly he meant by "cheaper and thinner" insulation to signify inferior or unsuitable insulation. Nevertheless there is reason to believe that there is a real divergence of thought on the point, which has a good deal to do with the opinions of those who advocate "specific" or "general" code forms. If the art of house wiring had reached or closely approached final development, so that no changes were to be expected in design or materials, a good deal might be said for a specific code, perhaps a highly specific one—a specification. If it has not, then the general principles governing the art should be clearly stated with as little hampering mandatory detail as practicable, to provide the utmost freedom for technical developments commensurate with those indispensable principles. There is a clear implication in the article that cheaper and thinner insulation would be undesirable, whereas the "generals" say that cheaper and thinner insulation, so long as it fulfills the actual technical requirements, would be a very happy development that might well be promoted by competition or any other available means. To be sure, the tables would have to be changed to take advantage of this progress in the art, but with a "general" form of code this should not be a very formidable operation since the fundamental rule stating the real requirements would remain unchanged and unimpaired.

Contrary to the opinion expressed by Mr. Evans, the administrative difficulties of inspectors are quite well known to the proponents of more general code forms; it is not believed that inspectors will suffer from clear statements of requirements in place of oblique or inferential statements. As to specific details, the test for them is in their net influence upon a changing art. I am certain that there is not an inspector in America who will say that technical development should be retarded for his convenience in administering his office.

Very truly yours,

ALEXANDER MAXWELL,
Engineer.

Coming Out Of the Maze

AS CITIES grow, a sense of civic beauty remonstrates against the maze of overhead wires for lighting, power, telephone, and street railway service which has obstructed the beauty of main business streets. To legislate these many wires underground would not only be expensive for the companies involved and the city itself, but would also tie up traffic, evincing disapproval from the merchants whose business would thus become affected. In many instances, the various systems have been so arranged that fewer wires are strung and all on a single standard, greatly cutting down the number of poles which line the streets.

Alameda, Calif., has followed this procedure in removing all old trolley, light, and power poles and placing one combined electrolier and power pole in their stead. Eighty-six standards now serve where three times that number were used heretofore. The new standards carry all streetlight, trolley, power, and telephone wires, and no other overhead wiring will be permitted in the future.

To make this installation without affecting traffic and business was the problem of J. B. Kahn, superintendent of the Municipal Electric Light Department. His plan of operation necessitated but one week of work for the entire installation.

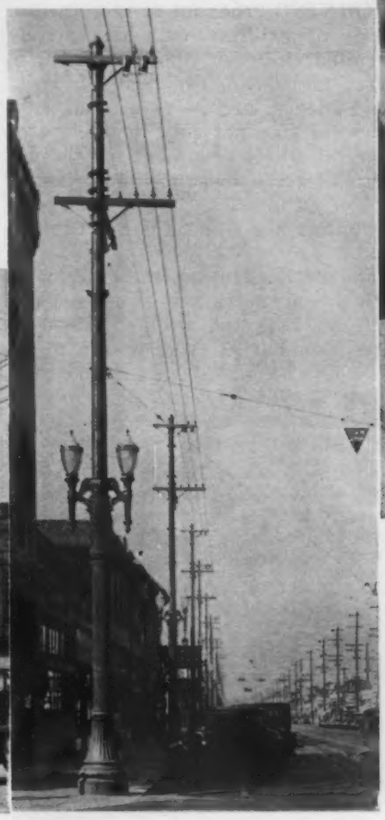
Speeded by the use of a power-driven drill, holes for the 86 power and light standards were completed in one day. A wooden collar block, temporarily clamped to the pole, was used to provide bearing for pike poles. The steel standard was then up-ended and lowered into the hole by a derrick truck or gin pole and handled to exact location and alignment with the pike poles. Wood blocks and wedges were then installed at the top of the hole to keep the pole in alignment until the hole was filled with an annular ring of concrete. These large, heavy combination poles, half of which were 49 ft. 6 in. long and half 51 ft. 1 in. in length, were erected through overhead wiring at the rate of twenty poles a day.

The main streets of Alameda are now much more sightly and, in addition, contain a better lighting installation. Thus, two problems were solved with one stroke.

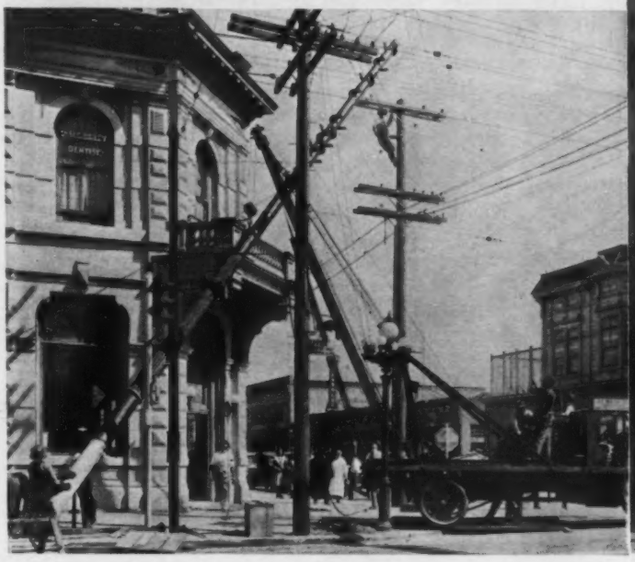
A similar installation has been made along San Pablo Ave., a long thoroughfare following the east line of San Francisco Bay through Oakland and Berkeley. The uniform, aligned appearance of the poles has greatly added to the appearance of this important avenue.

Above: One of the poles used to enhance the neat appearance of San Pablo Ave., an East Bay (Calif.) thoroughfare. Somewhat different both in design and utility from those used in Alameda, all wires are concentrated at the top, however, with lights at a determined height

Below: After the work had been completed, but one-third as many poles remained as lined the streets before. The better lighted and more pleasing appearing business section evoked comment from merchants, whose business continued uninterrupted during the installation



Derrick trucks hoisted the combination steel poles through the many overhead wires in the Alameda installation. About halfway up the pole may be seen a square, bolted block used as a footing for pike poles which steered the unit into place. After the pole had been made fast at the base with concrete, the block was unbolted and the lighting unit affixed. As many as twenty poles were erected in a day in this manner



General view of dining room showing one of the many lighting effects obtainable from this installation. Interesting features are the swinging curves of the ceiling, the metal wall portions, the varying colors of the walls

Bal Tabarin

In California's Bay District a Second Monument to Decorative Lighting Has Been Constructed—the Bal Tabarin Cafe. Original in Treatment, It Embodies New Designs, Presages Newer Departures, and Furthers Architectural Co-operation in Illuminating Artistry

By LEO G. GIANINI

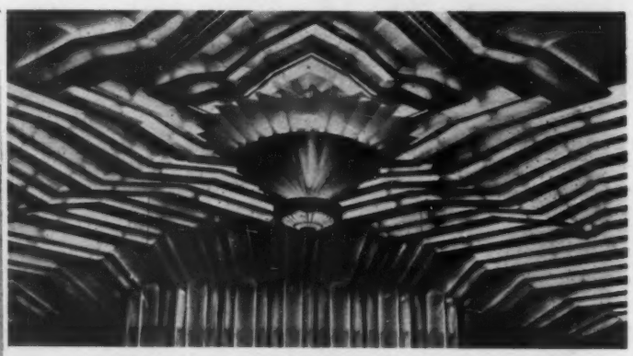
Illuminating Engineer, Edison Lamp Works, San Francisco

COMBINING the latest continental type of exterior with an entirely original interior, the Bal Tabarin, San Francisco's newest night club designed by T. L. Pflueger, of Miller & Pflueger, architects of that city, represents another forward step not only in the use of light but also in the architectural treatment for the use of light. It again introduces the sheet metal worker as a factor in the creation of an interior. In interior architecture, in method of lighting and effect, the Bal Tabarin is really new.

As may be seen from the illustration, the exterior is modern in design with a central feature of seven glass panels divided with silvery bars and aniline stained so that at night with the illumination from within it resembles a sunburst. The coloring ranges from a ruby at the base to a brilliant amber at the top. Each panel is semi-indirectly lighted from within and above by seven 200-watt clear lamps in concentrating-type mirror-glass show window reflectors. The wall reflecting surface behind the glass panels is tilted so as to produce greater uniformity of illumination on the panels.

The sunburst is pierced by concrete piers surmounted by a sign in black, block-type letters, set several inches

Exterior with bars inset in aniline-stained glass to resemble sunburst



Aluminized, lacquered metal is used as the ceiling, which converges into a four-cornered star design at the center. The fixture is also of metal. Note the design where the ceiling meets the metal wall portion, also the sweep of the ceiling along the wall.

out from the face of the surface, so that when the latter is illuminated the letters stand out in bold relief. Additional life is imparted to the sign by a line of red neon following the center of each letter. Thus, the letters with a red center line appear in silhoutte against an illuminated background produced by 100 50-watt lamps on 9-in. centers in a sheet-metal trough.

It is in the dining room that the sheet-metal man's dream is realized. The immediate impression is one of modernism and spaciousness combined. One derives a feeling similar to that on entering a room with walls and ceiling of mirrors. The treatment of the sheet-metal ceiling and its lighting are responsible.

Of interlaced open silvery sheet-metal, each piece 6 to 11 in. wide, the ceiling is formed, architecturally speaking, by the intersection of two barrel vaults, 12½ ft. high at the edges, converging at the center into a star-shaped design 17 ft. high. The metal is aluminized and finished with clear lacquer. Fabrication of the ceiling represents a real study in descriptive geometry.

Above the ceiling run eight large and six small metal troughs housing the lighting for the ceiling. The larger use ten 150-watt lamps and the smaller four 100-watt lamps, in each of four colors,—red, blue, amber, and clear. Natural color lamps are used except for the red, which uses a color hood over a clear lamp. Trough reflectors and lamps are so spaced that lamps of a given color are on 6-ft. centers 4 ft. above the ceiling.

Light is projected against the back of the metal section and is reflected through slots onto the under surface of each strip. The effect obtained is one which has been described variously as transparent metal and transparent glass. It is a rather mysterious luminosity, with the source of light not apparent. At times the metal seems to be white hot or red hot; the blues produce pseudo-phosphorescence. The treatment is an original conception of Mr. Pflueger. Not only does this construction permit of a very unique lighting effect, but it also serves as a ventilating medium.

Geometrical designs and flowing curves all direct toward the center, where hangs an inverted conical fixture of radiating metal fins. Six feet wide and 3½ ft. high, it is hollow in the center so as to house six 500-watt clear lamps and eight 150-watt lamps in each of the four colors. At the base of the fixture is a metal collar effect, housing fourteen 100-watt clear and colored lamps which indirectly light the under part of the fixture as well as the room itself.

Down the four walls of the room extend portions of the ceiling design, tying the whole interior together. Lights are mounted behind these portions also. The plaster sections of the walls are treated in orchid and pale green tones.

All lighting in this room may be remotely controlled from the raised orchestra terrace operating ten single-pole magnetic switches in the control room, or by manual control in that room. While dimmers are not permanently included in the control scheme, portable ones are used on occasion and may later be incorporated as an integral part of the control board.

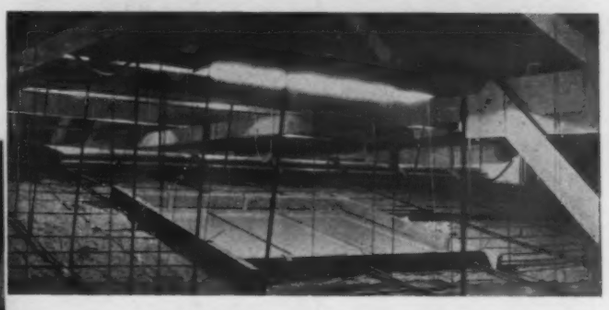
For this sumptuous lighting installation the total load is 81.6 kw., divided: Exterior, 9.8 kw.; sign, 5 kw.; ceiling, 57.6 kw.; central fixture, 9.2 kw. This does not include some 10 kw. of utilitarian lighting and conventional spotlighting.

While the phrases "painting with light" and "decorating with light" are daily becoming more familiar in the general public's vocabulary, the experienced illuminating engineer realizes far more than any one else that a satisfactory or pleasing result is only possible provided the lights which he controls are directed onto suitably planned, designed, or shaped surfaces. It is not within the province of the lighting specialist to evolve the base upon which his conceptions should play; that is the function of the architect. The lighting engineer is fitted to analyze the possibilities in the lighting of a given base; the factors of economy, light efficiency, and resultant effect are apparent to him. He can, therefore, become a valuable aid or tool for the architect, but it is primarily the architect who must pioneer the way for the new and modern in decorative lighting.

And so, in the Bal Tabarin, Mr. Pflueger* has extended the boundaries of successful decorative lighting practice to include an altogether *new* method of treating and lighting an interior. Obviously it required imagination and courage as well as the co-operation of competent specialists.

Credit for their part in aiding light architecturally should be given to G. M. Simonson, consulting electrical engineer, and to the Alta Electric Company, the electrical contractor. Much credit is due Frank Martinelli, owner and operator of the Bal Tabarin, for his courage in being willing to embark on this venture in troublesome times and for his faith in the popular appreciation of the modern and beautiful. The response of the public has amply justified his faith.

Below: Metal troughs contain lights in four colors. Troughs and lights are so spaced that colors are on 6-ft. centers. Some details of the ceiling fabrication may be ascertained from this picture. The window in the background is in the control room



Above: Skylights, which may be seen in the general view of the dining room, are lighted from smaller troughs containing the same color range. Above and behind the skylight may be seen a larger trough lighting the metal portion of the wing's ceiling

* This architect is a pioneer by nature. Other notable departures in his designing are the San Francisco Stock Exchange and the 450 Sutter Building, also in San Francisco.

League Brightens Lighting Market

Entire Electrical Industry Benefits From Promotional Sales Development of Active Utah Organization

FROM a humble beginning in 1923 with a one-man personnel to the present day when six men and two women are organized to render six distinct lighting services to the community, the Lighting Service Bureau of Salt Lake City has grown and prospered, showing better results each year in load added and wiring and fixture business created. In the ten months of its operation in 1923, the bureau added 66 kw. of new connected lighting load and increased the annual consumption by 154,900 kw.-hr. In 1930, the load added was 1,113 kw., accounting for a kilowatt-hour consumption of approximately 1,690,000, and in that year 544 jobs of wiring were created by the bureau, amounting to $135,123.

The bureau was formed to be one of the principal activities of the Rocky Mountain Electrical Co-operative League, now known as the Electrical League of Utah. The league is an association of distributors and jobbers of electrical equipment, electrical contractors, central station men, and telephone company representatives. It derives its support from all of these groups primarily on the amount of benefit likely to be received by each group from the league's activities. It employs an executive secretary in the person of R. E. Folland, who directs the league's work in the channels determined by the board of directors. The principal activity of the league besides the Lighting Service Bureau is the promotion of Red Seal wiring.

All of the Lighting Service Bureau personnel are employees of the Utah Power & Light Company; it sells no equipment; it simply creates business for league members. The co-operation of all members of the league in the various branches of the industry has been an important factor contributing to the favorable results achieved.

As now organized, the Lighting Service Bureau is divided into six separate departments, each rendering a different class of lighting service and each in the hands of one or more specialists as indicated.

1. Electrical advertising—2 men.
2. Architects and builders—1 man.
3. Store and office lighting—1 man.
4. Factory and industrial lighting—1 man.
5. Street lighting—1 man.
6. Residential and miscellaneous lighting—1 woman.

The personnel of the bureau is completed by one woman to handle stenographic work and records.

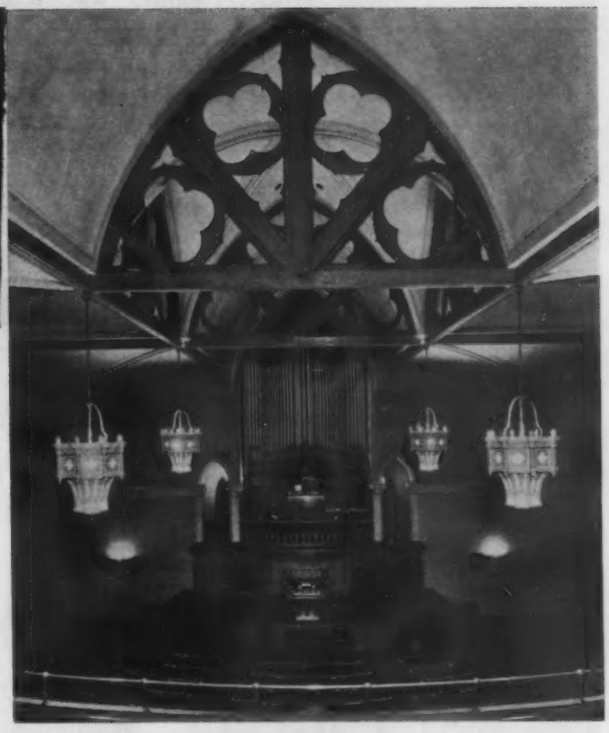
Methods of Functioning

1. *Electrical Advertising.* The work of the two men handling this department is confined largely to contacting prospects directly and interesting them by suggesting designs and plans and by giving demonstrations. The work is divided into the following classifications: (1) Signs and billboards, (2) show windows, (3) auto display rooms, (4) floodlighting, (5) type C fixtures, (6) miscellaneous.

In soliciting sign and billboard business, the principal service is in furnishing a design. When a suggested design is accepted, it is turned over to a sign manufacturer

Left: Two-hundred-watt lamps on 12-in. centers in four rows light this window to an intensity of several hundred foot-candles. It will be noticed that the reflectors in the back row have been placed for the purpose of illuminating the high trims made necessary by the construction of the window

Below: This Bennet-Culmer station is probably as elaborate as any in the territory, more than 30 kw. of illumination being used to brighten the corner. Cove reflectors shown on the side building are spaced 2 ft. apart, each containing a 150-watt lamp



Above: More than 100 window reflectors are used for general and display illumination in the interior of this used-car sales room at Salt Lake. No fixtures of other than this type are used. The system has advantages of economical operation and great effectiveness

Right: The First Presbyterian Church, one of the oldest in the city, was completely rewired and the four fixtures shown installed at the time of its remodeling. Each contains an upward and downward component of light distribution. Direct illumination is furnished by four 1,000-watt lamps and indirect lighting by sixteen 200-watt lamps. The organ, rostrum, and pulpit are highlighted by three 500-watt floodlight projectors located behind first truss beam in foreground

or billboard agency to produce. The rendering of a plan service for all the other classifications in this group has been found a very effective selling method. In the case of show-window lighting, it has been found that the bureau sells 60 per cent of the jobs for which it draws plans. In this field and in the fields represented by the auto display rooms and general floodlighting, demonstration with temporarily mounted units has proved productive.

2. *Architects and Builders.* Some very effective and purposeful work, both for creating larger lighting loads and for paving the way for other applications of electricity in the future, has been done in this department by the lighting bureau. Early in the bureau's history, a representative contacted all architects and builders in the city offering the bureau's planning service for proposed buildings, to include not only the planning of the lighting installation, but also the writing of complete wiring specifications. Thus the bureau early became acquainted with all the architects and builders, and this contact is maintained continuously today by periodic calls on all the members of the profession in the city. In offering its services to the architects and builders, the bureau undertakes to engineer the job completely as far as all electrical equipment is concerned, with the exception that it does not specify the lighting fixtures to be used. This service has been found so satisfactory that the bureau now gets all the larger jobs and writes the wiring specifications for 85 per cent of all the commercial and industrial buildings erected in Salt Lake City. This has tended to raise the standard of wiring in such buildings, and to pave the way, through adequacy of the original installation, for the future addition of electrical equipment of all kinds.

3. *Store and Office Lighting.* The work in this department is directly with consumers who are considered prospects, and the approach is sometimes made in following up rate discussions. Considerable preliminary work is frequently necessary to secure the interest of the prospect. Sometimes it is necessary only to clean the customer's existing fixtures, showing the difference this makes in the amount of light produced by a given wattage. Sometimes it is necessary to make an elaborate study of traffic and stoppages in front of stores that have been brightened up by higher intensity illumination. It is practically always necessary to present the prospect with a plan and layout along with competitive bids on the wiring changes necessary and on the fixtures. Here again the bureau does not specify the make of fixture, but does frequently recommend a certain type. The use of a photometer has been found very effective in demonstrating the importance of light distribution.

4. *Factory and Industrial Lighting.* In general, the same method of approach is made to prospects in this field as that used in the case of commercial establishments, though, of course, different sales arguments are employed in the two departments. Demonstrations have been found particularly effective in selling the factory operator, and for this purpose a portable outfit, containing four units that can be hung on various horizontal and vertical spacings to suit conditions, has been developed. This equipment is quickly installed in a small area of the factory to demonstrate the difference between this kind of lighting and the kind existing in the rest of the factory.

5. *Street Lighting.* The promotion of ornamental street lighting for different districts of the city is, of course, slightly more complex than the selling of lighting to individuals. According to city ordinance, a district can be formed by petition of a majority of the abutting property owners. It can then install ornamental lighting, paying the entire cost of the installation, but with the stipulation that the city engineer may dictate the type of standard to be used. This official, however, usually makes a selection in accordance with the wish of the district. He relies largely upon the bureau for estimates of cost and writing specifications. Jobs so planned and engineered are installed by contract.

In promoting districts, the bureau will work through

one of the interested property owners who acts as contact man and salesman. The bureau furnishes this individual such plans, cost data, and other information as he will need to further the idea among the other property owners. Through the aid of such key men, acting as the point of contact between the bureau, the people of the district, and the city, several districts have been successfully promoted, accounting for a substantial addition to street lighting load.

6. *Residential and Miscellaneous Lighting.* The problem of securing entree to a large number of homes in an economical manner for the purpose of selling more residential lighting has been solved by the bureau in a novel way. In this connection, it should be understood that adequate lighting in new homes is being pretty well taken care of through the Red Seal activity of the Electrical League, and that the principal problem of the bureau consists of improving lighting conditions in old houses.

Only one projector, placed across the street, supplies illumination for this building, one of the many small outlying stores which the bureau has sold on display lighting

As now operating, the plan is to work through community clubs and other groups of women in organizing classes in home decorating, with light as an incidental feature. These classes, which are conducted by a woman, have from twelve to 125 persons enrolled, and continue from two to three months, depending on the kind of artwork being taught. Interest is sustained by changing the subject matter of the classes with the seasons. For instance, early in November the classes are devoted to making ornaments suitable for Christmas decorations. This activity ties in closely with the general promotion of indoor and outdoor lighting for the Christmas season, and during the last season some 800 ornaments using light in some form and amount were produced by the classes being conducted by the bureau representative. Following the Christmas activity, classes in lamp shade making are organized and conducted for about three months. This activity creates light consciousness and results in a demand for advice on modernizing and beautifying the home, which is freely given by the bureau representative since it opens the way for many suggestions for improving home lighting conditions and adding residential lighting load. Following this course, three months' time is devoted to classes in making lighted ornaments of a more general character than the ornaments used at the Christmas season. By the time these classes are over it is practically time to start the Christmas activity again, and in this manner a full year of instruction in some phase of decorating with light is occupied, resulting in the request for the performance of several special lighting services to individual homes.

Other activities falling in the miscellaneous group are the lighting of churches, meeting halls, amusement places, and miniature golf courses and sports fields of all kinds.

For results the bureau can point to a steadily growing increased connected load and increased kilowatt-hour consumption annually in the eight years of its existence. This growth by years is represented in the following table:

TABLE I
INCREASED LOAD AND CONSUMPTION

YEAR	Increased Connected Load—Kw.	Approx. Increased Kw.-hr. Cons.
1923 (10 months)	66.2	154,900
1924	273.4	405,500
1925	306.4	412,500
1926	432.0	818,000
1927	468.8	898,000
1928	901.9	1,265,000
1929	1063.0	1,600,000
1930	1113.0	1,690,000

Another result is indicated in the increasing number of wiring jobs created each year by the bureau activity, as shown for the last three years:

TABLE II
INCREASED WIRING BUSINESS CREATED

YEAR	No. of Jobs	Value
1928	205	$139,492
1929	320	156,742
1930	544	135,123

While the activities of the bureau have been extended during the past two years to include some other sections of the Utah Power & Light Company territory the above figures cover only the Salt Lake division.

The organization of the Lighting Service Bureau is such that, in any department appearing to offer possibilities for economic expansion, it can be expanded by the simple expedient of adding personnel in such department. As now organized, the bureau appears to be creating new business each year commensurate with its cost of operation, is producing profit for all concerned, and is furnishing a highly beneficial service to the community.

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PORTABLE POWER FOR CONSTRUCTION—On construction jobs where electricity is not available or in the field away from lines, a new portable power unit just introduced by Westinghouse will be found valuable. Small and compact, weighing but 120 lb., the unit is rated at 1 kw., 110 volts d.c., sufficient for portable electric tools such as drills, saws, hammers, and grinders, which are needed on many construction and repair jobs. The generator is coupled to a 1½-hp. gas engine, with a speed range between 1,800 and 4,000 r.p.m. Besides supplying current for tools, it may be used for floodlighting duty at night.

SURFACE WIRING WALL CHART—A wall chart illustrating all stock items of metal molding and devices used for surface wiring has been published by National Electric Products Corporation, Pittsburgh. The hanger shows installation methods of surface wiring in common use, and is designed to be hung up in every estimating room for ready reference. These installation hints show the easiest, quickest, and neatest way to add a light and increase the possibilities for use of electric current. Copies are available upon request.

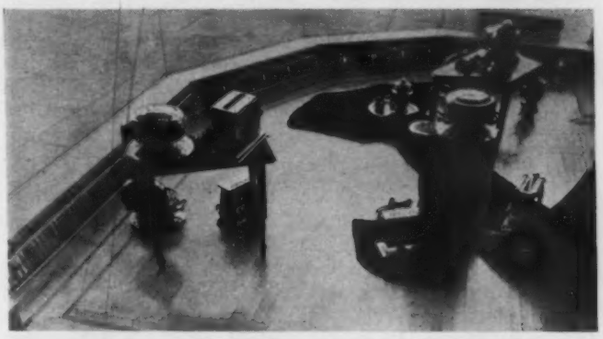
When Beverly Hills Dealer Goes Modern

He Develops Many New Display and Lighting Ideas That Offer New Sales Possibilities

Above: Occupying the south unit of three grouped stores under a single entranceway, at 437 North Canyon Drive, Beverly Hills, Calif., the G and L Electric Company is as modern as the decorations of the facade on the building it occupies. Inset in the front of the building above the sidewalk is a large, etched glass, luminous panel, behind which are color lens equipped reflectors. The windows extend from a few inches above sidewalk level to the ceiling, giving a lofty effect, to enhance which Mr. Grabmair has used no valance or ceiling lighting.

Right: Frank J. Grabmair, one of the partners, incorporated some of his personal innovations in the window design. Niches, illuminated from below, and backed by mirrors, make eye catching backgrounds for single appliance display

Below: Since no overhead lighting is used, this store employs footlights. A continuous footlight trough, fitted with louvers, provides novel lighting effects on appliance displays in this high glass, low platform window. Without backing, the window provides a full view of the interior



Below: Opening on an alley entrance, off which two large garages provide storage for pipe, wire, and heavy equipment, an ample shop space is provided. Next to it a small double "pantry"-like stock room for shelf stock gives access to the store. Radio test bench, wiring materials stock arrangement, and Red Seal labeled panel feature this shop. The store wire is pulled into a gutter with the panel next to it. Future changes will leave the panel undisturbed.

Left: Indirect lighting by means of light boxes distinguish the store interior lighting. Special Cole fixtures, inset, with concealed lamps on continuous dimmer operating cycle, create a mobile effect which the dealer says is "better than a sign for this business"

Left: Decorated in black and silver, with modernistic shelving, showcases, and stands, even lamp display rack, with the office on a mezzanine behind a silvery metal grille in full view of the store, the establishment is a thoroughly modern exemplar of ultra-modern electrical convenience. Behind the electrically heated office are a radio demonstration room and a quiet drafting and estimating room

Repairing the Dull Seasons

Plenty of Repair Business Is Stored on Closet Shelves and in Attic Corners if the Dealer Will Go After It. Here's a Way.

RESPONSIBILITY for the dull seasons which periodically afflict him lies with the dealer and not with the public, the Otto K. Olesen Company, Hollywood (Calif.) dealer in electrical appliances, has found out. This conclusion was reached after the question was submitted to a laboratory test, the laboratory being the firm's repair shop.

One of the devices used to ascertain where business goes in dull times was an advertisement inserted in a shopping paper each Saturday which read:

> On Monday only we will repair without charge electric irons, waffle irons, toasters, and percolators. Should any parts be required, they will be charged for, but the service work will be absolutely free.

The first Monday that this offer was in effect required the services of three clerks to take care of the steady stream of appliances brought in for repairs. The time required to repair 50 per cent of the appliances was one minute, although the average repair bill on each appliance was $1.25. The total repair business for the day was slightly more than $100. In addition to this, 10 per cent of the repair customers bought new or reserviced appliances.

"Our curiosity as to where the business keeps itself during off-periods was more than satisfied," said J. M. Holman, manager of the retail department of the store. "Most of it is lying overlooked on closet shelves and in forgotten attic corners. It doesn't seem possible that there were so many fifteen-year-old appliances in existence.

"The customer's reaction to the advertisement was this: 'Here is something free. Can I take advantage of it? Maybe that old iron I threw away five years ago only needs servicing. If they suggest new parts I can say with good reason that it is not worth it.' We were prepared for this, however. We looked the appliance over when it was brought in and handed it back, saying it wouldn't pay to repair it. If the customer wished to talk more, we followed with a sales talk: 'This is an old iron, and the chances are that while it was in service many kinds of cords were used with it. Nine out of ten appliances that are brought in here for repair have been ruined because the owners supposed that one cord might serve for several appliances. You will notice that every appliance you buy has a cord with it. That is the cord selected by the manufacturer for maximum efficiency with the appliance. Other cords may serve, but they cut down the life and performance of the appliance.' The customer usually recalls that he is guilty of doubling up on cords, and so we sell him an extra cord or two. That is one of the many ways in which we were able to profit by our free repair day.

"An interesting sidelight is that 90 per cent of the repair work brought in was on off-brand appliances. This, too, we made known to our repair service customers. Every owner of an appliance was about 75 per cent hopeful that no new parts would be needed, so when new parts were needed we not only put them on the bill in itemized form, but showed the customer what we had done."

Although the offer of free repair work was confined in the advertisment to electric irons, waffle irons, toasters, and percolators, many customers brought in other appliances ranging from curling irons to lamps. The free offer was extended to these also.

"Of course, we don't put on an event of this kind at Christmas time or at the height of a busy season," commented Mr. Holman. "Nor do we wait until we are in the midst of a dull period to stage it. Experience has taught us the signs of an approaching slack season; then we start these Monday sales. We chose Monday because nearly every home has an electric iron, if no other appliance, and with ironing day ahead of her, every housewife will be apt to take advantage of our offer."

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When May Delivery Be Refused?

JOHN A ordered certain electrical fixtures for his company from an Eastern manufacturer. In his order, he instructed the seller to ship the goods via Williams Steamship Company, marking the consignment "electrical fixtures," "part of carload," and "boat sails from Philadelphia from Drexel Building." These instructions were important because the electrical company assembled carloads for shipment to the West and these goods were to be part of freight then being consolidated for shipment to the electrical company. The goods were not shipped by the Williams Steamship Company, nor was the bill of lading marked "part of carload," and by such failure the goods were not included in the consolidated car of freight. The electrical company was then billed for the carload rate on a minimum car without securing the entire weight possible. Fnding that the shipping directions had not been observed and costs were therefore high, John A refused to accept the goods. Was his action justified?

The court held, when the case was brought up, that A was justified in not receiving and paying for the goods. Upon the failure of the manufacturer to obey shipping directions, he could not recover damages from the electrical company. The principle is analogous to that which justifies a party in repudiating an entire contract upon the non-performance of time or place of shipment as set out in a mercantile contract.

For Golfing Customers

The popularity of golf is being capitalized by the Mactolf-Doll Electric Company, Electragists of Glendale, Calif., in a series of blotters depicting parody historic golf events. The famous characters of history are pictured in cartoons, confronted by some golf problem. The calendar-blotters on which they appear form an attractive advertising medium and are very much in demand among the customers of this company.

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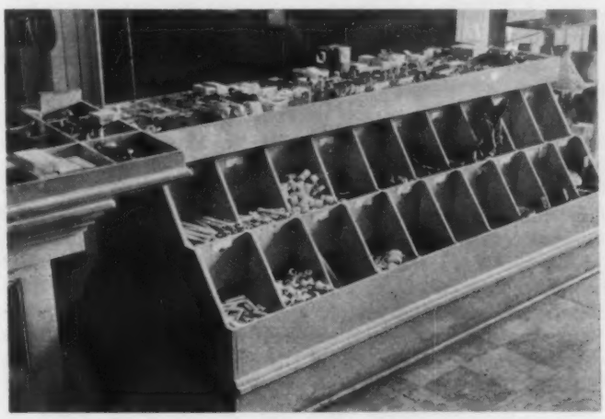
Bringing Dime Store Methods to Appliances

IN THE Brown-Johnstone electric store in Spokane, one of the truly "personal" dealers of the Northwest, all appliances are in the open, whether on tables or in glass cases. This policy not only helps sell the articles, but it provides customers with a chance to browse and inspect new "kinks" in merchandise while waiting for a salesman who is then busy. Five- and ten-cent stores first capitalized on this principle.

Household wiring materials are kept in an open case, as shown by the illustration. Insulators, knobs, cords, pull boxes, and receptacles are exposed in troughs where they may be examined. Top compartments contain flashlights, tape, sockets, and similar smaller parts. Customers who enter the store to buy one part usually leave with others which they might have forgotten but for the display.



Why a Real Collection Policy Works

PAIGE'S Electric Store, San Bernardino, Calif., has a stringent policy of collections which has brought unusual returns. J. H. Paige, the owner, explains these facts about his credit system:

"1. Only keen, aggressive salesmen who have the desire and ability to help enforce our collection rules and to secure every payment on merchandise which they sell to customers on the time-payment plan are employed by our company.

"2. Salesmen do the collecting on their sales.

"3. The salesman's commission does not come from the initial payment, as is usually the custom, but from the succeeding payments as they are made. Thus, it is to the salesman's interest to see that each payment is made promptly.

"4. Salesmen do not sell merchandise with some optimistic hint as to the company's leniency in enforcing payments; rather, they stress the necessity of fulfilling credit obligations for the furtherance of merchant relationships.

"5. Salesmen learn much about their clients' business by incidental conversation. Our men place this information on cards which are filed and these notes often prove valuable aids in making collections."

Selling Hot Prospects Cold

Only Dealers Sell in the Northern California Spring Refrigeration Drive, but the Mother Utility Will Uncover Prospects and Help Close the Deal in Many Ways

EVERY local refrigeration bureau in the nation-wide million refrigerator drive has established plans for co-operative sales promotion and selling, but the northern California bureau is singular in that the dealers alone are in the selling vanguard, as the Pacific Gas and Electric Company does not merchandise refrigerators. However, in its plan of co-operation, the company has made itself an important factor in the tie-in drive by setting a quota for the spring drive of 75 days (April 15 to June 30) of 7,500 refrigerators, or 100 sales per day, by an advertising program which calls for 325 newspaper advertisements in 40 northern California daily newspapers, and by sponsoring joint refrigeration exhibits and window displays in 75 northern California company offices. These and other promotional parts of its program are designed to stimulate buying interest immediately for the refrigeration industry.

Because of the large participation of the utility and the dependency upon it for success, permission was obtained to designate the campaign "The A. F. Hockenbeamer Electric Refrigeration Plan," in honor of the president of the company. The activity is receiving the full support of distributors and dealers in the territory.

In preparing for the drive, a printed, illustrated book of instructions to division executives outlining in detail the participation authorized for the company was mailed in advance of the opening. Preceding this mailing, organization meetings with distributors and dealers were held to insure the proper co-operation and to avoid duplication of effort. On the opening day the rank and file of the company's employees group were apprised of their part in the program by means of a broadside directed to their homes.

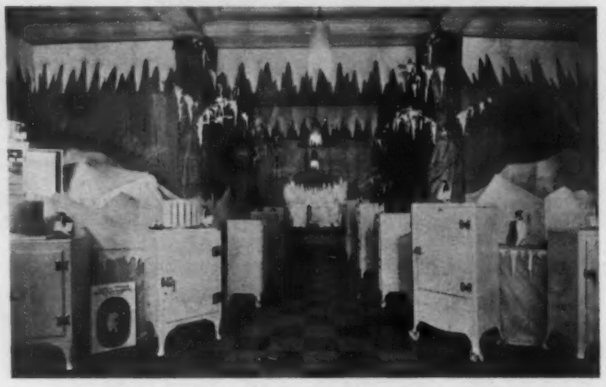
Advertising copy already contracted to appear between April 15 and June 30 under the utility name totals 11,744 column inches and will carry many additional columns of publicity together with dealer tie-in advertisements equal to or greater than the total just mentioned. This is general idea-selling copy provided from a joint contribution of company and distributors.

Refrigeration expositions in San Francisco and Oakland and joint refrigeration exhibits in 75 company offices outside of these points provide a convenient display for the use of consumers and a direct tie-in with the educational advertising copy. These exhibits are well attended and have already resulted in a number of sales. Their main purpose is educational, however, and the attendants are instructed to permit full investigation of all refrigerators without aggressiveness to sell or obtain names of prospects which might in some cases be objectionable.

Expositions are decorated in a manner to give an arctic setting to the display of some 20 to 25 refrigerators of various makes, and special spectacular lighting is used to harmonize the ice scene and bring out the miniature aurora borealis by means of flashing light colors. One of the particular features of the campaign is the number of different makes which are included: General Electric, Copeland, Mayflower, Majestic, Servel, Kelvinator, and Frigidaire.

During the month of May all P. G. and E. electric bills will carry a refrigeration sticker in colors. This sticker contains in addition to the adopted slogan, "Invest in an Electric Refrigerator," and a 50-deg. thermometer, an invitation to visit displays maintained by the company and dealers.

Augmenting the consumer propaganda is the intercompany campaign known as the "P. G. and E. Baseball League." This activity, which provides a league pennant and 25 cash prizes, is expected to result in several hundred employee refrigerator purchases and the submission of several thousand consumer prospects for dealer follow-up. To arouse and sustain interest in this endeavor among the employee group, in excess of 16,000, the company has authorized a bonus payment of $2.50 for bona fide prospects which result in a sale.



From 20 to 25 refrigerators of seven makes are included in central exhibits such as the one shown. Flashing lights add to the effectiveness of the aurora borealis display in the background

Scoring in the game will be according to the following rules: Home run—a refrigerator sale by dealer to a prospect submitted during campaign; run—purchase of a refrigerator by an employee; hit—refrigerator prospect accepted by all agencies to whom submitted; ball—refrigerator prospect accepted by some agency or agencies and rejected by one or more (four balls equivalent to one hit); strike—prospect rejected by all dealers; foul ball—prospect reported by dealer as disinterested and indifferent.

This entire program is heartily endorsed and supported by the Northern California Electric Refrigeration Bureau which is made up of representatives of refrigerator distributors and central stations. Carrying out the activities in the various cities and towns under the central control of the main bureau are local groups which are made up of all refrigerator dealers and the local power company representatives. In order that the plan may operate uniformly these local groups operate on instructions issued through their headquarter companies, the distributors in the case of the dealer member, and the Pacific Gas and Electric Company general office in the case of central station members.

Co-operation To the Core

Pacific Power & Light Company Has Announced This Goal in Presenting Three New Plans to Its Dealers: Better Water Heating Profits, Contract Financing, and Exclusive Sale Rights on a Line of Ranges

ALTHOUGH the Pacific Power & Light Company has always enjoyed an amicable relationship with its dealers, through co-operation in such matters as price maintenance, advertising, and carrying charges, the utility has gone a step further in its program of dealer good-will by announcing a plan whereby it will finance contracts for ranges and water heater sales for all local dealers in its territory. The plan also contemplates assistance to dealers by aiding with home service and demonstration work and by making it possible for the dealer to avail himself of the use of the company's service department. With this plan in effect, the utility feels that it has gone about as far as it can in a dealer-central station co-operative set-up.

In substance, the new plan follows:

For contract financing, district managers are authorized upon execution of a proper assignment to purchase from electrical equipment dealers contracts for installment sales of electric ranges and water heating installations where the credit rating of the buyer and the installment terms of the contract are sufficiently sound to meet the requirements of the policy of the company with respect to the sale of merchandise from its own salesroom.

The sales co-operation plan is also new, making the utility salesman's interest in dealer sales parallel with his interest in the utility's sales of appliances. Under the present plan of compensation, company salesmen are paid for the sale of an electric range or water heater by a dealer in the same way as though the sale was made from the company's store. Thus salesmen are interested in helping a range* sale which has been started by a dealer. In the future, when a salesman, in soliciting for range business, finds a customer who advises him that she intends purchasing an electric range from a dealer, he is to handle the situation by assuring the customer that the range she is contemplating purchasing will give her good satisfaction and advise her that the company is pleased that she will be cooking with electricity. The date when the customer expects to make the purchase is then obtained.

Upon returning to the office, the salesman reports these facts and the dealer is at once informed and advised to close the sale as soon as possible. The salesman then does not attempt to sell the customer a range until after the date upon which the customer indicated she would purchase from the dealer. As soon as possible after this date, the salesman may call back and ascertain if the range has been purchased and is being used. If the range is in use, the customer is invited to use the company's service department. If no range has been sold, the salesman then may consider that the prospect is open and immediately attempt to sell a range offered by the company.

A special service plan is also offered to the dealer, for the company is interested in seeing that satisfactory service is obtained from all ranges on its lines. The plan, which is not obligatory upon the dealer, follows:

The dealer will furnish to the service man a skeleton supply of range repair parts most commonly required in the servicing of his line of ranges. Such parts will be furnished on memo. The dealer will then instruct purchasers of his ranges to call the company service department for service. The service man will make the necessary repairs and report back to the dealer the parts used. The dealer is then billed for time and mileage required in making the call, while the dealer makes his own charge to the customer for this service.

Any range purchaser is offered the privilege of using the company home service department and such other services as the company ordinarily gives.

On water heaters alone, the company has instituted a plan profitable to dealers. The price of a double (booster) heater installed will be $89, but the company will install the heater for the dealer, charging him $69 and leaving him a profit of $20 for the sale, or it will sell him the material required, uninstalled, for $60. The dealer thus receives $9 for the work of installing.

Still another offer of the company relates to an additional line of ranges. Under this offer, a dealer may purchase Westinghouse ranges on consignment from the company. The ranges remain the property of the company while on the dealer's floor. As the company sells only Hotpoint ranges, the plan allows dealers full dominance of the field with the Westinghouse range. It is expected that business will be stimulated by this plan.

During a current campaign a premium offer of aluminum ware particularly designed for electric ranges, to the purchaser of any electric range from either a dealer in the territory, or from the company, is being advertised by the utility.

While no dealer is required to accept or take advantage of any part of this offer, reports from the territory indicate that the presentation of these plans has done much toward even further cementing dealer friendship.

* Where ranges are mentioned, water heaters are implied.

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Selling Leisure Sells Ironers

IRONER displays of the H. C. Capwell Company, Oakland department store, have borrowed a note from electric ranges and also feature the purchase of more hours of leisure by the housewife. Few ironers, a neat human interest display, plus the sales talk, make an attractive window.

Substation Expansion Typifies Economy of Designing for Future Requirements

By A. SHIPEK

Transmission Division, Puget Sound Power & Light Company, Seattle

Terminal Substations of Puget Sound Power & Light Company's Submarine Cable Transmission Are Examples of Adequate Planning for Growth. Changes in Capacity Have Been Facilitated by Careful Engineering in the Original Design and Installation, Based on the Predictions of a Thorough Load Growth Survey

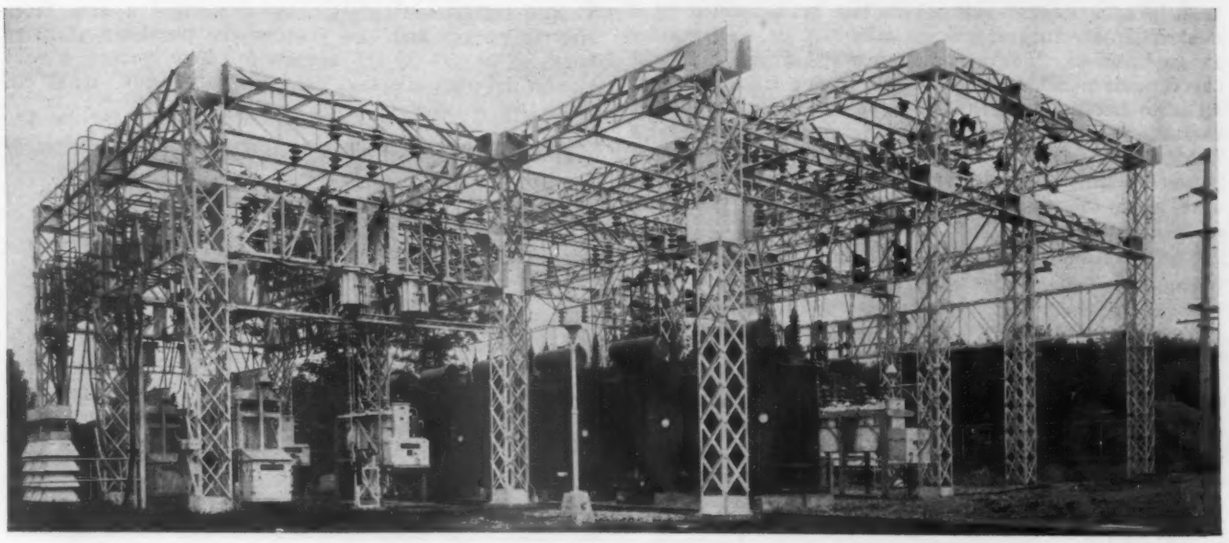
FOREMOST among examples of installations emphasizing the necessity for vision, engineering, and imagination in substation design, is the Puget Sound Power & Light Company's interconnection with its Olympic Peninsula system. This tie, completed in 1926, and enabling the parent system to supply the power demand associated with the rapid growth of northwestern Washington, was accomplished by two submarine cable circuits across Puget Sound from Richmond Beach, north of Seattle, to President Point on the peninsula.

Electrically, this was an event of considerable importance, establishing a record for distance and depth of submarine power transmission. This phase of the project has previously been mentioned in these columns and the purpose of this article is to outline the design which permitted the shore substations to be adapted to the ever-changing load requirements with a minimum of expense and effort.

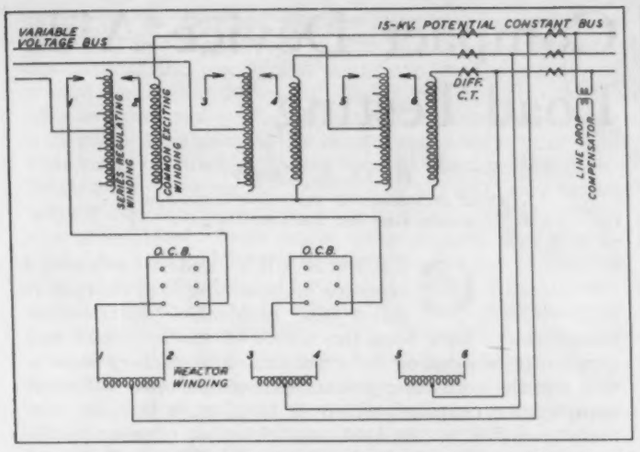
Energy is supplied at 55 kv. to the step-down transformers at Richmond Beach, where it is reduced to 15 kv. for transmission over two parallel, three-phase submarine cables to President Point, a distance of approximately four miles. There it is transformed to 66 kv. and fed into the existing Olympic Peninsula system at that point. Originally, a rather simple substation layout was installed at the shore ends, the equipment at each consisting of a lattice bus structure, four 2,500-kva. self-cooled transformers (one held in reserve), and the necessary cable terminals. At Richmond Beach only, a 55-kv. oil circuit breaker and a grounding transformer bank were installed. The breaker provided overload and ground relay protection and, as the cables were operated from the delta-connected secondary, it was necessary to provide a neutral point for the cable system by installing three 10-kva. transformers connected in star on the primary side and delta on the secondary.

Future load requirements of the peninsula distribution system governed the design of the original installation. Provisions for anticipated increase in capacity and refinements in regulating and protective features made at that time were carefully engineered and proved, in the light of subsequent developments, to be excellent investments.

After two years of operation, the increased importance of this tie made a more comprehensive scheme of relay protection desirable, and the relay system as shown was installed. The protection of each circuit consists of three balance-current relays operating in conjunction with four ground relays. Although the



Richmond Beach substation showing cable takeoff for four-mile submarine cable transmission to President Point. The steel structure is designed to facilitate substation expansion and circuit changes made necessary by load growth. Terminals of the two submarine cables can be seen at the extreme right

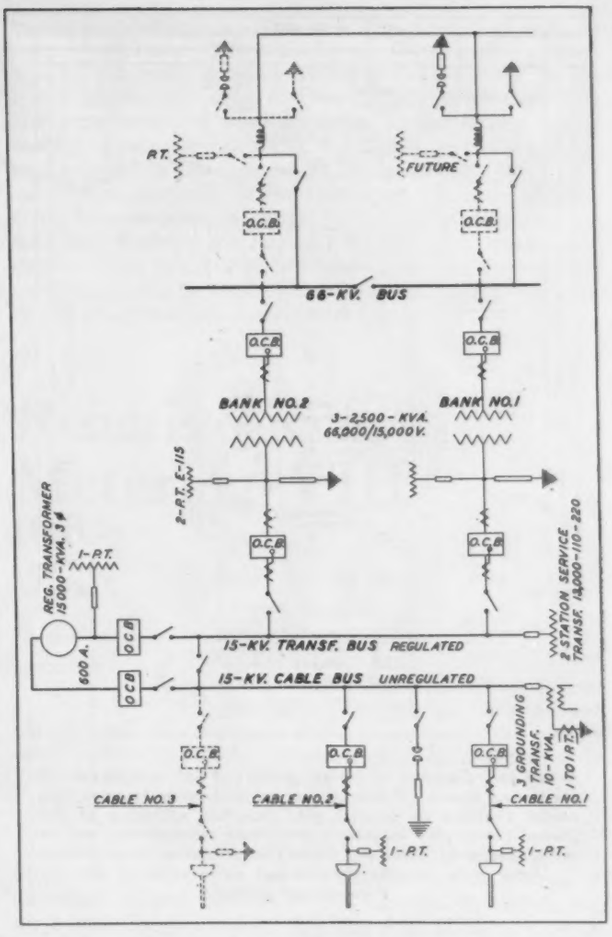


Expanded diagram of regulating transformer showing method of regulating voltage between incoming and outgoing 15-kv. buses. This is the only transformer of its type in the Northwest and takes the place of induction voltage regulators for voltage control

balance-current relays require no explanation, it might be helpful to outline briefly the selective operation of the ground relays. These employ the induction principle and are made directional by employing two coils, one for the the ground current obtained in the ground connection of the grounding bank, and the other for the residual current obtained in the common of three star-connected current transformers in the main cable leads. When current in both coils is in phase and away from the bus, these relays will close their contacts. They are very sensitive and operate, i. e., hold open, on very small values of current. During parallel operation of the cable the ground residual relays of both circuits operate to trip on faults external to the current transformers, and must be made selective by the use of two similar relays whose operating coils are connected in the common residual of the two previously mentioned relays and also in the ground circuit common to all. The relay scheme at President Point varies only in the use of power directional relays in place of the balance-current relays. As no control house had been built, this relay equipment was mounted on a temporary panel in the transformer untanking tower and operated from a 12-volt battery.

Up to this time no method of correcting for voltage fluctuations inherent in the operation of the 55-kv. system in the Seattle area had been provided. Although the load density then probably did not justify installing regulating equipment from the economic standpoint, the improved quality of the service resulting therefrom would maintain the high standard of the company's policy toward its customers, and accordingly in 1928, a 15,000-kva. voltage regulating auto-transformer was installed at President Point. This was cut into the 15-kv. incoming bus and a new regulating bus was provided from which outgoing lines were taken off. As shown in the accompanying illustration, each phase of the bus is connected to the midpoint of a series regulating winding having parallel taps for the tap-changing switches and transfer contactors. The opposite bus connection is made to the midpoint of a reactor. Only one of the tap changing switches is moved at a time, placing a momentary short on the coil of the series winding through the reactor, but no load current is broken during the 10 per cent buck or boost voltage range. For an interconnection of this nature well defined voltage steps, inherent in a tap-changing transformer, are not objectionable.

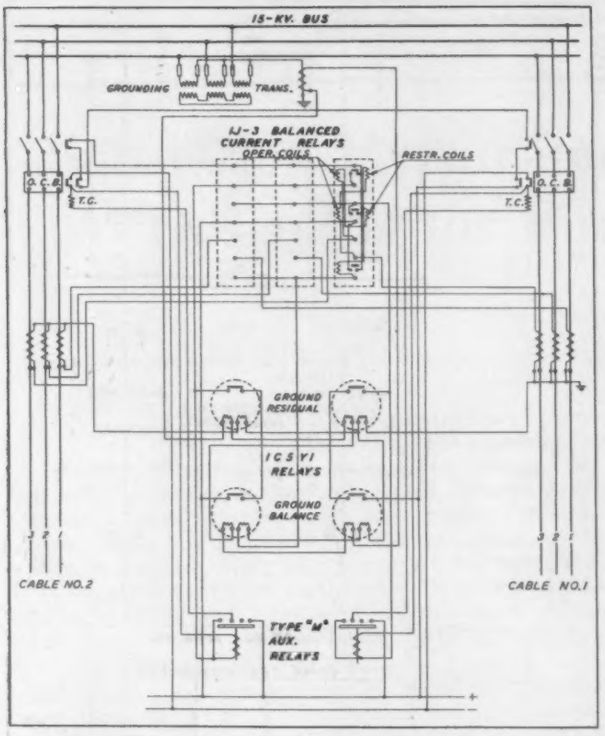
This transformer is the only one of its kind in the



Single-line diagram of circuit arrangement at President Point showing connection of regulating transformer to regulated 15-kv. bus take-off. Dotted lines show projected addition to substation capacity. The economical use of switching apparatus is a feature of this design

Northwest and its selection was prompted by a lower first cost as compared with induction type regulators used with separate series and excitation transformers. By installing the transformer in a future cable bay already provided for in the design of the station, much less revamping was required than might be expected from so radical a change.

Recently the load on the Olympic Peninsula had increased to a point where more transformer capacity was desirable and duplicate units of the first transformer banks were installed, giving the interconnection a 15,000-kva. capacity. Parallel operation of the transformer banks immediately made it desirable to protect against internal faults by the use of differential relays. Oil circuit breakers of full rupturing capacity would be required with this type of protection, but, with only one source of supply, it was possible to dispense with the oil circuit breakers on the line for the time being. An inspection of the photograph of the Richmond Beach station and a reference to the one-line diagram of connections shows how it is possible to make major additions without interrupting the service. The sectionalizing of each bus is an important feature in accomplishing this and also permits economy in the use of switching equipment. Back-up overload protection and totalized metering was obtained by paralleling the secondaries of the current transformers at the 55-kv. bus at Richmond Beach.



Schematic diagram of relay protection of equipment at Richmond Beach. Balanced current protection between two cables operated in parallel plus selective operation of the ground relays give maximum protection to apparatus and to maintenance of service. Note the grounding transformer bank with current transformer in neutral of the Y-connected primary

With the increasing complication of control and relay circuits, a one-story, concrete control building, approximately 20 x 30 ft., was built to house the switchboards, telephone equipment, battery and associated charging equipment, and operator's desk. On account of the isolated location and the importance of the interconnection, one operator is maintained at each station subject to call at all hours. All control is of the manual type and is mounted on a vertical switchboard with back panels where ample space is provided for the ever-shifting requirements of metering and relay schemes.

An interesting sidelight on the construction and additions to the President Point substation is the method of handling the heavy pieces of equipment in an isolated location. As the winter storms, tides, and Teredos would soon weaken or destroy any structure supported on driven piling, the transformers and other equipment were transported to the location on a barge which was settled into place during an outgoing tide. Dock stringers were built up to the deck level and transformers and other equipment moved to shore on rollers.

Reference to the photograph of the Richmond Beach installation illustrates how the steel framework lends itself to the requirements of this type of substation. Additional bays can be added easily when necessary, adequate support for switching equipment and buses being incorporated with the addition. In the five years of their operation, these substations have undergone continuous improvement and expansion, paralleling the load growth and service requirements of the Olympic Peninsula, but foresight in laying out the original design has enabled changes and additions to be made expeditiously.

Compact Device Aids Load Testing

By O. A. KNOPP
Chief of Bureau of Tests and Inspection,
Pacific Gas and Electric Company

CUSTOMARY and time-honored methods of obtaining load characteristics on residential distribution transformers have been the source of much inexact and frequently misleading information. Satisfactory regulation for the consumer primarily depends upon sufficient transformer capacity, which in turn must bear an economic relation to the load requirements. Consequently, correct transformer loading is partially a problem of peak demand, and in the past has been treated as such.

To secure the required loading data it is common practice during the peak hours to send out two men, a lineman and a tester, equipped with a split-core current transformer measuring set. The lineman climbs the pole and clamps to the primary or secondary the current transformer which is connected to the meter on the ground through long flexible leads. A reading is taken and the outfit moves to the next transformer to be tested. Obviously, the current indication so secured does not represent the true condition because of the probability of securing a high momentary value of current or of missing the combined peak of lighting, cooking, or heating loads. Aside from the high probability of error, this method also introduces a safety hazard caused by the metallic circuit from the line to the meter on the ground, and furthermore, as the peak load generally occurs in the evening the working day must be rearranged to cover the evening hours, which seriously interferes with the regular routine of business.

With the foregoing limitations in mind, W. B. Allatt,

Fig. 1 (left). Load testing device showing construction details and method of mounting on the conductor

Fig. 2 (right). Device clamped on conductor. The demand meter as shown can be replaced with an indicating instrument if desired

of the Pacific Gas and Electric Company, suggested an improved line testing set to eliminate the objectionable features in the use of the split-core line-testing set as a load measuring device for transformers. This device was designed and perfected by the author and represents a decided advancement in accurately determining load conditions on practically any type of circuit. While retaining the fundamental principle of the split-core transformer and indicating meter by a unique design of the new instrument, these parts are combined into a self-contained unit which weighs only 6 lb. and can be handled readily by one man. However, both the transformer and the meter had to be adapted to the requirements of this particular application.

A 2-in. cube of laminated steel is split diagonally to form the current transformer core, and a cylindrical hole of a diameter suitable for enclosing the average conductor is provided through the center. The secondary winding consists of four coils, two mounted on each half of the core. One side of each coil is concentrated in a slot parallel to the axis of the primary conductor and the other is fanned out over the area of its corresponding cube face. This arrangement of the core and winding insures a uniform flux distribution and a low reluctance path, thus keeping magnetic losses low, to the decided improvement of the accuracy of low current readings. Each half of the core is mounted on a clamping device very similar in action to a pair of tongs. This is best shown in Fig. 1, which illustrates the mechanical construction and shows the set in the "open" position preparatory to being clamped about the conductor which acts as a primary. Fig. 2 shows the device mounted on the conductor.

Mounted on one side of the transformer enclosing case is a standard current demand meter of the "lagged" type, whose operation is based on the differential action of two thermostatic strips, one of which is heated by the current and the other responding only to changes in the ambient temperature. Briefly, the lag is represented by the rate at which the temperature of the latter approaches that of the heating strip, and the inherent value of the lag is fixed by the proportions of the units. In this instance a 30-min. lag is provided, meaning that the unit requires 30 min. to reach the maximum value of temperature corresponding to any constant value of current. The indicator is advanced to a point on the scale corresponding to this current, where it will remain until a subsequent period of a greater current flow advances it still further. This type of instrument is ideal for the purpose of measuring transformer loads as the highest average demand over a definite period of time is obtained through its use. Furthermore, it is a strong, sturdy instrument with few moving parts and requires a minimum of attention.

The instrument can be calibrated on two scales corresponding to the use of all or half of the current transformer winding, increasing the applicability of any particular set to varying load conditions. Aside from the technical points of interest, it will be noticed that the handles of the set are well insulated and of sufficient length to preclude any possibility of a lineman coming in contact with the high-voltage circuit, a feature which can be varied to meet almost any distribution voltage requirement.

By using this combination, one lineman can place a testing set on each circuit at any time during the day that will fit into his schedule conveniently. At a corresponding time on the following day he can remove them, knowing that an accurate demand indication will be retained until it is recorded. If instantaneous readings are desired for certain classes of work, motor and lighting loads, the demand indicator can be replaced by an indicating instrument, in which case it is possible to measure very small loads. The capacity of the new line current testing set, with demand indicator, is 125 amp. on the low range and 250 amp. on the high range, whereas with the same core and winding, using an indicating instrument, the capacity is lowered to 15 amp. on the low range and 30 amp. on the high range. Ease of installation, unquestioned accuracy of data obtained, and reduced labor costs are advantages which have been realized by the company through the use of this set. Its development results from the demand of more complete information on distribution circuits, which in turn reflects the ever-rising standards of electric service.

▼

Reactive Kva. Metering-VIII

(Part 2)

By E. C. GOODALE
Tacoma, Washington

CONTINUING from Part 1 (ELECTRICAL WEST, May 1, 1931), it follows that since line currents pass through the current transformers and are metered, their numerical values and phase relations must be determined in order to find what their actions will be inside the meter.

Current A is (from Kirchoff's current law) made up of the vector sum of current 3 minus current 1 plus current A_1 and by Fig. 28(A) is found to be 551 amp. at –5° 38′ to the right horizontal. Current B is equal to current 1 minus current 2 plus current B_1 and is 460 amp. at an angle of –142° 35′. See Fig. 28(B). Current

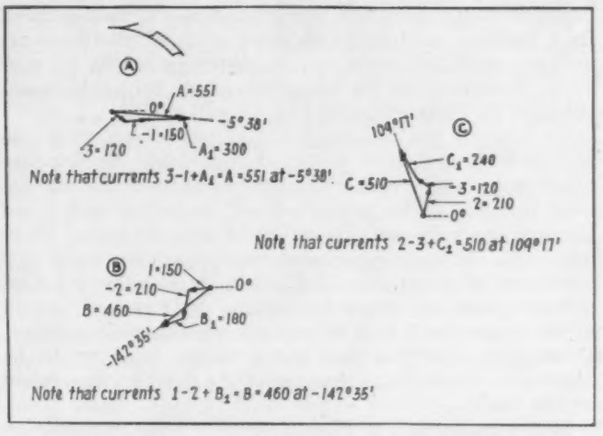


Fig. 28. Vector diagrams to determine the magnitude and phase angle of the line currents

C is current 2 minus current 3 plus current C_1, resulting in 510 amp. at 109° 17′. (See Fig. 28(C).

Registration of the meter elements is as shown in Fig. 29. Since in element A the current A reacts with the voltage A, its registration will be equal to the product of voltage A by the power component of current A with respect to it. A is found to have a power component of 548.3 amp. with respect to voltage A. Hence the registration is $6.6 \times 548.3 = 3{,}619$ kw.

In a similar way the power component of current B with respect to voltage B is 338.7 and its registration, therefore, is $5.4 \times 338.7 = 1{,}829$ kw. Likewise the power component of C current with respect to voltage C is 386.5

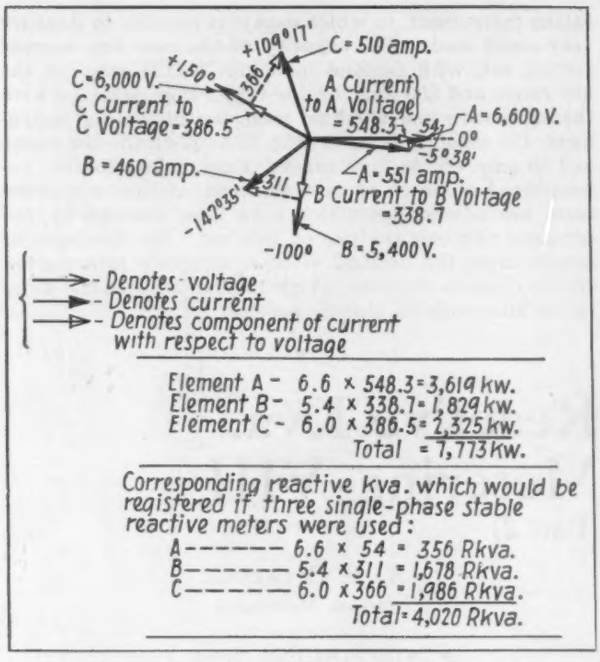

+104°17'
C = 510 amp.
+150°
C = 6,000 V.
C Current to C Voltage = 386.5
386
A Current to A Voltage = 548.3
54
A = 6,600 V.
0°
-5°38'
B = 460 amp.
311
A = 551 amp.
B Current to B Voltage = 338.7
-142°35'
-100°
B = 5,400 V.
Denotes voltage
Denotes current
Denotes component of current with respect to voltage
Element A - 6.6 x 548.3 = 3,619 kw.
Element B - 5.4 x 338.7 = 1,829 kw.
Element C - 6.0 x 386.5 = 2,325 kw.
Total = 7,773 kw.
Corresponding reactive kva. which would be registered if three single-phase stable reactive meters were used:
A------ 6.6 x 54 = 356 Rkva.
B------ 5.4 x 311 = 1,678 Rkva.
C------ 6.0 x 366 = 1,986 Rkva.
Total = 4,020 Rkva.

Fig. 29. Registration on kw.-hr. meter, in terms of primary values

and the power registered is $6 \times 386.5 = 2{,}325$ kw. This gives a total registration on the three elements of $3{,}619 + 1{,}829 + 2{,}325 = 7{,}773$ kw., and, as may be remembered, this is exactly the power taken by the load.

If it were possible to secure voltages for the reactive meter which were exactly 90 deg. behind those applied to the active meter, it would be found that the reactive meter also would register correctly, regardless of voltage unbalance. Of course, by the use of three single-phase reactive meter elements using condensers, as described in a previous article which dealt with single-phase reactive metering*, such correct metering might be possible. However, for the usual case of slightly unbalanced voltages the connection of Fig. 25 will suffice.

In Fig. 29 are tabulated the values which would be obtained if three well designed and stable single-phase reactive meters or meter elements were used, the current coils being in series with those of the active meter and the voltage coils parallel with the active meter's voltage coils. Of course, any external impedance such as a condenser or resistance used in the single-phase reactive meter's potential circuit is included as if it were a part of the meter (as it is in effect) when making connections. It may be observed that these values total up to be identically the same as the sum of the reactive kva. taken by the load.

In the connection of Fig. 25, however, the registration will not total up as correctly, since the voltages applied to the reactive meter voltage coils do not have the perfect 90-deg. relation which they would have under balanced voltage conditions.

In the ideal or balanced case, voltage AA would be 90 deg. behind voltage A, BB 90 deg. behind B, and CC 90 deg. behind C. Fig. 30 shows how to determine the value and phase angle of the voltage actually applied to these coils. The number of turns on the voltage transformers from the common point n to the near mid-points a_1, b_1 and c_1, respectively, are 57.7 per cent of the full number of turns in the secondary of each transformer. Hence the voltage induced in these portions will be 57.7 per cent of full secondary voltage in each case.

* See ELECTRICAL WEST, Sept. 1, 1930, p. 140.

The voltages applied to the reactive meter in each case are made up of the vector difference of two of these 57.7 per cent portions as illustrated in Fig. 30. Voltage AA (on the basis of primary voltage) then is found to be 5,395 volts, lagging voltage A by 62° 50′ instead of by 90 deg. as in the ideal balanced voltage case. BB results in 6,950 volts lagging B by 94° 27′ and CC is 5,310 volts lagging C by 114° 50′. Thus it is apparent that these voltages are neither equal to their "namesakes" nor are they at the proper angle of lag for correct reactive metering. The resulting error in registration, however, is not as great as might be supposed, being plus 7½ per cent. Of course this seems large, but when the badly unbalanced case that it represents is taken into account it does not seem too great and it is doubtful if in the usual case of 1 or 2 per cent voltage unbalance and 2 or 3 deg. phase-angle unbalance the error would be more than 1 per cent. At any rate this connection makes phase-shifting auto-transformers unnecessary and gives just as correct reactive metering as do the phase-shifting auto-transformers used in three-phase three-wire circuits, both being subject to the same relative amount of error under conditions of unbalance.

In Fig. 31 the registration of this reactive meter is tabulated. As previously stated, a reactive meter is simply a power meter energized with different voltages (as to phase) from those used on the power meter, and hence its registration is governed by the same laws and is equivalent to the product of the voltage multiplied by the power component of the current with respect to that

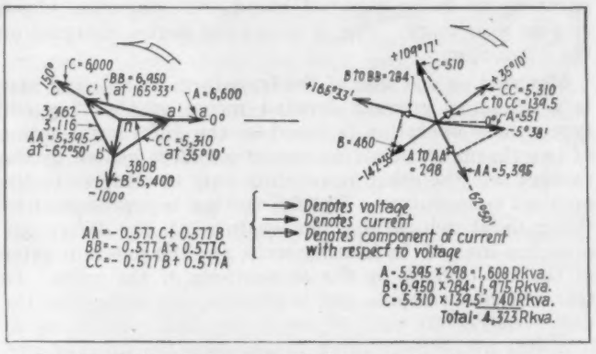


Fig. 30 (left). Voltages applied to reactive kva. meter in terms of primary values. Fig. 31 (right). Regisration on reactive meter in terms of primary value

voltage. The power component of current A with respect to voltage AA is 298 amp. Hence A will register $5.395 \times 298 = 1{,}608$ Rkva. Current B with respect to voltage BB is 284 amp., and hence its registration is $6.950 \times 284 = 1{,}975$ Rkva. Current C component with respect to voltage CC is 139.5 and the power is $5.310 \times 139.5 = 740$ Rkva. This gives a total registration of $1{,}608 + 1{,}975 + 740 = 4{,}323$ Rkva. as against the 4,020 Rkva. taken by the load, or a registration of 107.5 per cent, as previously mentioned.

It is apparent, then, that connections as shown in Fig. 25 using three-element meters give exact metering for power, regardless of circuit unbalance, but may introduce errors in reactive metering, the error manifesting itself only in case of *voltage* unbalance.

Therefore it seems advisable, unless extreme accuracy is desired, to use this type of reactive metering in installations in which three-element power meters are in use. It fits in well with the power metering connections and if line-to-neutral voltages are nearly balanced the error will not be large. If extreme accuracy is desired it seems as if single-phase reactive meters or meter elements would be necessary if there be any doubt as to the balance of the line-to-neutral voltages.

Using Hydro Plants To Boost Voltage

By MABEL MACFERRAN
Southern California Edison Company Ltd.

IN THE operation of a hydro plant dependent on uncontrolled stream flow, there are seasons of the year at which, owing to low water conditions, the full capacity of the plant is not required for generating kilowatts. In this event it is not necessary for the plant to stand idle,—it can be made to return dividends on the investment it represents by allowing it to "boost voltage." By this term is meant operating the machines over-excited, with the result that when the kilowatt load appoaches 0 a heavy lagging "wattless" or quadrature current flows to the load, supplying the latter's demand for excitation or reactive component. This in turn prevents the voltage from sagging as would be the case if the excitation were not supplied.

Since operating a plant for "boost" involves keeping all the machines on the line when perhaps there is not even enough water to carry full kilowatt load on one, and since it takes a certain amount of water merely to turn over each machine, it often appears to the operators of such a plant that water is being wasted and that a needlessly inefficient condition is being permitted to exist. This, however, is not the case if the economics of the system as a whole are considered, for the financial value of the boosting action often greatly outweighs the loss in water.

In order to understand how this may be, it is necessary to take into consideration the fact that since the hydro plant is subject to periods of curtailed output on account of low water, it is necessary to provide a supplementary steam plant to carry all or most of the load. It is by the shifting of reactive component back and forth between this steam plant and the hydro plant that financial saving can be accomplished.

Assume that the hydro plant contains several machines, and that in the dry season there is only water enough to supply rated kilowatt output on one of these machines. Suppose, therefore, that all the machines but one are taken off the line. This leaves the one remaining machine loaded to its full kilowatt capacity, and it must be run at or close to unity power factor to avoid overheating the winding and exceeding the kva. capacity of the transformer bank if one is associated with the machine. Consequently, the steam plant must not only carry all the rest of the kilowatts, but must operate at a power factor a little lower than that of the load, because the load demands reactive component and it will take it from the steam plant if it cannot get it from the hydro plant. This action is shown in Fig. 1, where for the sake of simplicity the line drops between the hydro and steam plant voltages and the load voltage are neglected.

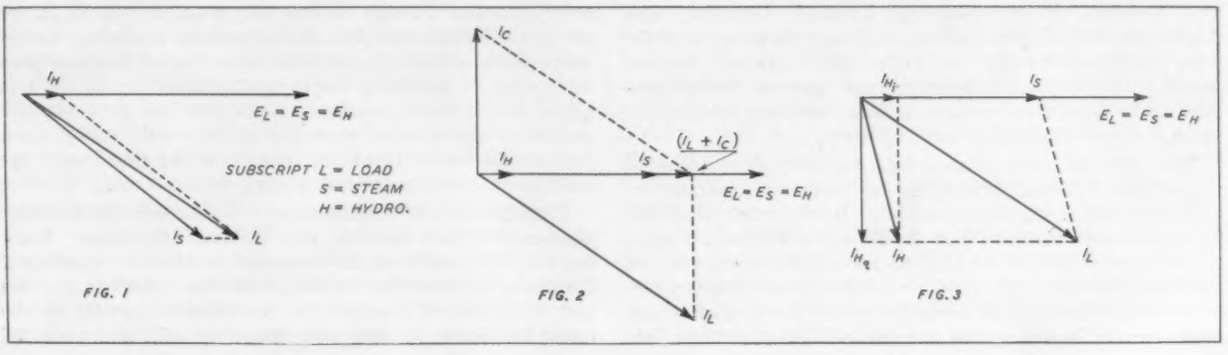
Vectorial analysis of method used to supply reactive kva. to a power system. In Fig. 1 the hydro plant is running under an assumed low-water condition with one generator loaded to capacity. In Fig. 2 the system power factor on both hydro and steam plants is corrected to unity by the use of sufficient condenser capacity. In Fig. 3 approximately the same result is obtained without investing in condenser capacity, by operating hydro plants at full kva. capacity but no kilowatt output, drawing from the reservoir only sufficient water to supply the generator losses

It is clear from Fig. 1 that the ampere capacity of the steam generator and associated transformers and line must be much larger than would be the case if this plant were able to run at unity power factor. This excess ampere capacity costs money. Since it is imperative to keep down investment costs in the steam plant due to the very poor load factor thereon, good engineering demands that, if possible, some method be devised to permit the steam generator to run at unity power factor.

The first idea that presents itself is that of purchasing a synchronous condenser and placing it in parallel with the load. This machine will run as a motor taking a leading quadrature current from the line, and this will balance out the lagging reactive component of the load and allow all the generators to run at unity power factor, as shown in Fig. 2. This solution may or may not save money as compared with providing the excess ampere capacity in the steam plant.

This brings up the advisability of spending money for synchronous capacity when there is plenty of this commodity lying idle at the hydro plant. Why not put the unused machines back on the line as synchronous condensers, allowing them to "motor" from the line at full field with all the water cut off on the hydraulic end? They will then produce a result identical with that of Fig. 2, so far as vector relations are concerned (except that, in practice, some of the reactive component contribution will be lost in process of transmission from the hydro plant to the load point).

It is a worth-while idea, provided the hydro machines are of the impulse type. If they are of the reaction type they cannot be motored for any length of time without dangerous heating of the runners and runner seals, unless seal-ring cooling water be provided. As a matter of fact, a great many small stream-flow hydro plants are of the reaction type without provision for seal water, and they cannot be motored with safety. However, just because a unit cannot be motored is no reason why its synchronous capacity cannot be used for turning out reactive component. It is only necessary to furnish enough water to run it as a generator at 0-kw. output, the losses now being supplied from water power instead of from the line as would be the case if the unit were motored.



The vector diagram will now be as shown in Fig. 3. Steam is running at unity power factor just as it was in Fig. 2, and the hydro plant is generating a current I_H made up of the original kilowatt component $I_H i$ from the one fully loaded machine, and the new reactive component $I_H q$ from the newly-added zero-load machines.*

This is the point at which the operator of the hydro plant raises objection, because he sees the output of his loaded machine drop owing to the fact that some water is being diverted to turn over the unloaded machines. Or, even if the load and reactive component be equalized among all the machines in the plant, the total kilowatt output of the plant will be less than before because all the machines are now running under inefficient fractional load conditions. The proper way to look at the situation is to remember that the waste of water in the extra boosting machines is not much greater than would be the losses in a synchronous condenser running from the line and turning out the equivalent amount of reactive component, and the purchase of either a synchronous condenser or extra ampere capacity at the steam plant has been avoided. Mathematically, a check could be made by balancing the annual value of wasted water against the annual saving in carrying charges on the investment forestalled.

* Note that a synchronous condenser *takes leading current from* the line when over-excited. If the same machine be converted into a generator by supplying torque to its prime-mover, the field remaining unaltered, it will then *deliver lagging current to* the line.

▼ ▼ ▼

Transmission Line Built Across 53 Others

By FRANCIS CURTIS
Engineering Department, The Southern Sierras Power Company

CROSSINGS over 53 power lines, some of 66-kv. potential, 44 telephone lines, two trolley lines, seventeen railroads, two state highways, a 50-ft. water tower and seven houses, were met with in the construction of a 62-mile, 110-kv. system interconnection between the San Bernardino substation of The Southern Sierras Power Company and the Los Angeles Gas and Electric Corporation's Seal Beach steam-electric plant. Further complicating the construction work on this line was the great variety of foundation conditions met with which required almost exery expedient from blasting to pumping or cribbing before the concrete foundations could be poured. Hard granite was encountered in the West Riverside Mountains, quicksand along the Santa Ana River, and peat land elsewhere in Orange County, in addition to a variety of soils which ranged from heavy "adobe" to sandy loam or sand and gravel.

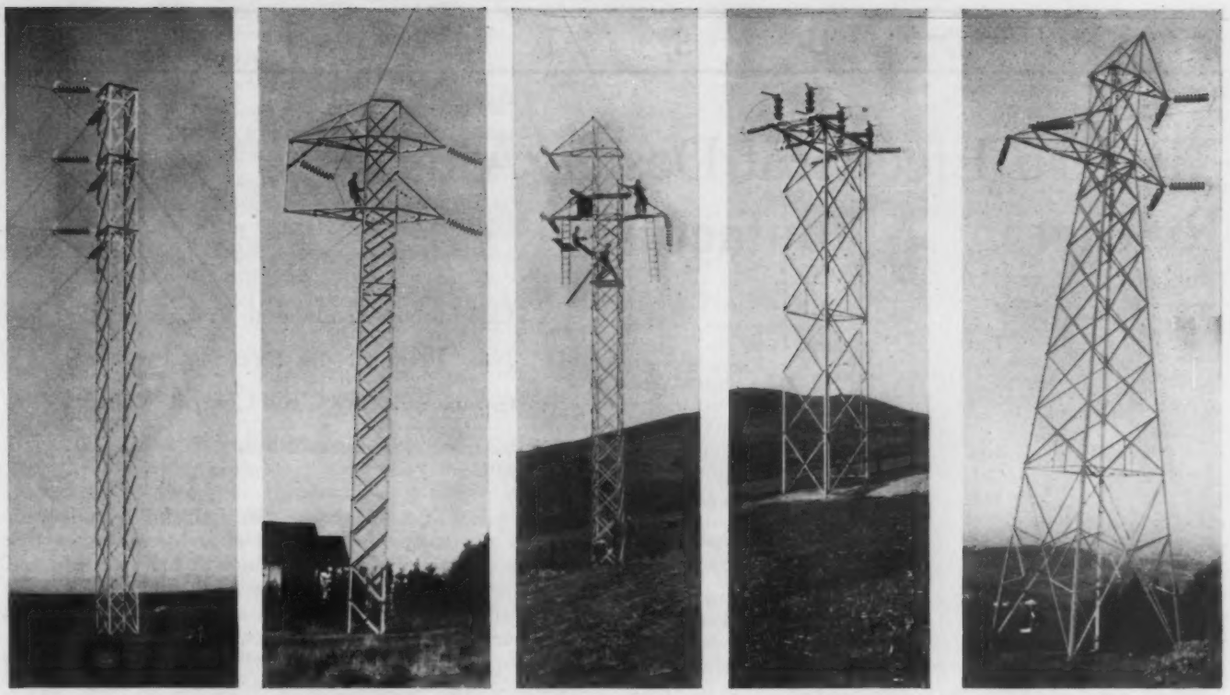
Most of the power lines which had to be crossed were hot, and to cross them safely required extreme care. Where the new line approached a crossing, a high wood pole was set just beyond the energized line to be crossed and in the path of the new construction. On top of this pole were mounted double crossarms, 6 ft. long with pins at each end to serve as guides. A rope cradle was stretched between the wood pole and the steel structure on the other side of the line being crossed and conductors were pulled across by means of a hand line. To meet the demands of rights-of-way through restricted and highly developed areas, it was necessary to adopt a structure designed to be self-supporting against normal strains of line angle construction, guying being prohibited by land owners where it was necessary to traverse citrus groves and cultivated territory.

Two general types of steel line supports were designed with four different variations in crossarm assembly to accommodate angle construction. Briefly, the specifications were as follows: For the standard suspension pole, a 4-ft. square section of latticed galvanized angle iron, 66 ft. high; for the self-supporting type of structure, a latticed frame tower was used, the upper portion of which was similar in design to the suspension structure just mentioned and the base of which flared out to a spread of 14 ft. on each side. Ten-foot tapered angle-iron earth bases were standard for all line suspension poles for normal construction, whereas concrete foundation blocks were used for the towers.

Variations in crossarm assembly, as mentioned, fell roughly into four divisions: For line angles of 1-10, 10-40, 40-70, and 70-90 deg. In the first classification the suspension pole is standard except that dead-end string assemblies were used, whereas for angles of from 10 to 40 deg. the type of construction known as suspension angle construction was the practice. In this latter design the suspension insulator string is supported so as to take the resultant tension of the line angle, thus effecting an appreciable saving in insulators over dead-end construction. In this second group also variations were made in the position of the insulator string as required to accommodate changes in temperature and wind conditions as they would affect the tension of the line conductors. To insure satisfactory ground clearance between live parts and the steel structure at all times, a careful study of the component forces determining the position of the insulators under varying conditions of temperature and wind was made prior to the construction of the line. The results of this preliminary study were carefully checked after the line was placed in service and it was found to be within 5 per cent of actual measurement.

The third classification in crossarm assembly consisted merely of dead-end construction with special crossarms to meet the requirements of angles of from 40 to 70 deg. For angles of from 70 to 90 deg. the standard pole section was used, guyed in both directions of the line but omitting crossarms entirely. Dead-end insulator strings were attached directly to the pole, resulting in a change to vertical configuration of conductors, a change easily accomplished from the normal right angled triangle configuration by dropping the isolated conductors of the triangle to the lower position on the vertical pole. In the design of guyed steel poles the guys are depended upon to take the entire resultant tension of the line angle, the pole itself serving only as a supporting strut.

Throughout the 62-mile length of the line the average pole and tower spacing is eight to the mile. Hard drawn, seven-strand 2/0 copper conductor was used throughout the entire length of the line. Except for the last 10 miles of line in the immediate vicinity of the coast insulator strings were made up of eight units of



Five types of structures used on the transmission line. At the left is a standard vertical angle pole. Next is a standard suspension angle pole. Center, an insulator crew at work on a dead end pole. Note use of a dead end ladder. Fourth is a standard sectionalizing switch structure and, last, a self-supporting angle pole

the heavy porcelain clevis-and-tongue type in suspension and nine units for dead-end construction. In the 10-mile coast section, special type insulators of the tongue-and-clevis type were used, nine in suspension and ten for dead-ends. All insulator strings were equipped with conductor fastenings, having arcing horns. No overhead ground wire was used at all.

Two distributing points for line construction materials were chosen, one at Anaheim in Orange County, and the other at the company's central warehouse in Riverside. This arrangement facilitated the distribution of equipment and materials and eliminated the long-distance hauling of material that would be involved with only one distribution center.

All field work was handled by specialized crews. Advance construction was undertaken by a crew whose duties were limited to hole digging. Bases were completely assembled by a crew at the Riverside general warehouse for the early period of line construction and this same crew was transferred to the Anaheim center after construction had progressed to the vicinity of that point. Following the hole-digging crew came a crew which painted the pole bases with asphalt paint, set the bases, and backfilled. Where concrete bases were required another crew working out of Anaheim handled the work. The steel erection crew started in at San Bernardino and followed right along as the line was built. All steel material was punched and cut to specifications, delivered loose to the pole or tower sites, and fabricated piece by piece from the ground up.

Following the steel crew came the wire stringing crew, using tractors and paying out all three conductors along the right-of-way for distances as great as a mile at a time. Conductor stringing blocks were fastened in place on the crossarms and the conductors raised to the crossarms. With the conductors in place on the arms, they were pulled to the proper tension by means of a tractor in lengths averaging about a mile but depending to a certain extent upon the line angles encountered. A predetermined amount of sag was obtained by the use of sag boards and sighting between poles. A second check of sags was made by a survey party who checked conductor sag by means of a transit. Care was taken, of course, to check stringing temperatures. In general this method of conductor placing proved efficient because in the small line angles encountered the conductor was strung right on through and dead-end insulator strings were cut in later. An insulator crew followed in the wake of the stringing crew to remove the conductor stringing blocks and to hang insulator strings in place.

Careful systematization and specialization of the construction work along the lines described proved most efficient and promoted construction speed to a desirable extent. The line was erected and placed in service in 103 working days from which twelve days were lost because of severe weather conditions, leaving a total of 91 days.

Completion of this line provides for an interchange of 30,000 kva. between The Southern Sierras Power Company and the Los Angeles Gas and Electric Corporation, appreciably increasing the system capacity of the former company without increasing its generating capacity. Because of the radically different characteristics of the load of these two companies, both have achieved operating advantages through the interconnection which will improve the load factor of both systems. The load of the Riverside company is of an agricultural nature, having a daily mid-morning peak and an annual peak during the month of June or July. The metropolitan characteristics of the load supplied by the Los Angeles company creates a daily peak in the early evening hours and an annual peak in January.

Both systems operate on a frequency of 60 cycles, but owing to a difference in the operating voltages of the systems, a transformation is necessary at the San Bernardino end of the line. A 30,000-kva. auto-transformer bank provided with taps to meet varying requirements brings the line voltage down to the 88-kv. rating of the San Bernardino terminal bus.

Modern Electrical Design Aids Refractory Manufacture

By LOUIS F. LEUREY
Consulting Engineer, San Francisco

Continuous Production Process of the New Plant of the Stockton Firebrick Company Relies Upon Control Features of Electrical Installation

MEETING the exacting demands of the modern industrial trend toward straight-line production requires close co-ordination and accurate control of all composite processes which make up the finished product. Industry has universally accepted electricity as the means to this end and the new plant of the Stockton Firebrick Company, near Pittsburg, Calif., is a good illustration of a manufacturing process relying upon a carefully designed electrical installation. The electrical installation was made by the T. L. Rosenberg Electric Company, of Oakland.

This plant, one of the most modern in the country, is devoted to the exclusive manufacture of high grade refractories. Briefly outlining the process, specially selected materials for the product are delivered by rail into a receiving hopper from which point they are conveyed either to storage or process. Processing begins with the proper blending and grinding of the material, which is accomplished in the dry pan mixer illustrated in Fig. 1. This is an excellent example of a close coupled "V" belt drive combined with a flywheel and clutch mechanism to permit the motor to start without the heavy inertia of the grinding mechanism.

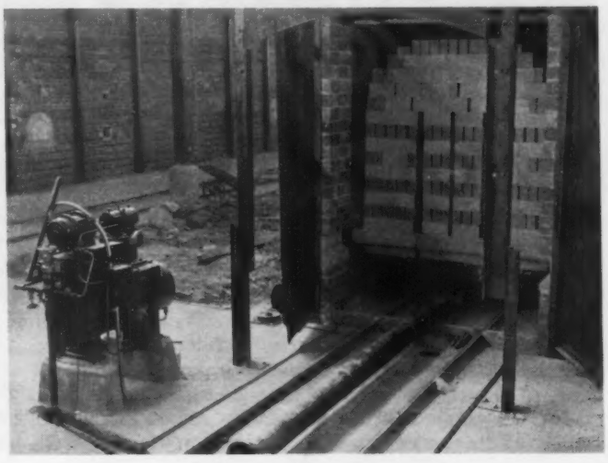
Fig. 1. Dry pan grinding and mixing equipment showing the V-belt drive and clutch mechanism. At the left may be seen a steel-enclosed, motor distibution switchboard, showing the fuse disconnects mounted on the front and motor starting switches and disconnects mounted on the rear of the enclosure. Note the enclosed bus gutter at the top rear of the switchboard

Screening and classifying the raw material is accomplished in a series of Hummer screens operated by 15-cycle magnets energized from a small single-phase, 15-cycle motor-generator set.

After grinding and mixing, the material is delivered, again by a conveyor system, to a series of heavy hydraulic presses where it is shaped into bricks ready for drying. The pressed bricks are set on kiln cars constructed of cast iron frames covered with Diatex insulating brick and refractory blocks. Drying is done in a continuous-type dryer approximately 150 ft. in length, heated with waste heat recovered from the main kiln.

After drying, the bricks enter the main tunnel kiln. This kiln was designed and erected by the Harrop Ceramic Service Company of Columbus, Ohio, and is 406 ft. in length, lined with refractory material and equipped, near the central area, with fourteen natural gas burners which are fed with gas at a pressure of approximately 8 oz. per burner and with air injection at 1 lb. Burning of the bricks in this kiln is a continuous process, the kiln cars, loaded with 1,700 bricks per car, being introduced at one end and moved forward at a constant rate of speed by a motor-driven hydraulic pusher, as shown in Fig. 2. The kiln capacity is approximately 67 cars, or 113,900 fire bricks. This tremendous load of 600 tons is handled by a 1-hp. motor through the hydraulic mechanism. A limit switch at the delivery end of the kiln operates as a safety device to stop further movement in case the automatic control on the charging end should not func-

Fig. 2. Entrance to main kiln. The car entering the kiln is loaded with 1,700 bricks and is propelled through the kiln with the hydraulic piston shown in the foreground. By means of the hydraulic mechaninsm, a 1-hp. motor is able to propel 67 such cars, or approximately 600 tons, through the kiln



tion, or in case of negligence on the part of the operator.

Necessary air for combustion of the gas entering the fourteen furnaces described above is provided by a 3,600-r.p.m. centrifugal compressor. This compressor is driven by an induction motor under very severe operating conditions because the fires are maintained in the kilns day and night for indefinite periods. Temperatures within the kiln are closely controlled by automatic operation of blowers, draft fans, dampers, and burners to correspond with the accompanying temperature chart which shows the temperature gradually rising to a maximum of 2,500 deg. F. and then gradually cooling until, at the delivery end, the bricks are cool enough to be unloaded. Three to four days are required for a car to traverse the length of the kiln, during which time it passes through the various heat zones as shown. The exact control of temperature enables a continuous delivery of perfectly burned brick.

It can be seen from the above description of the process, that reliable, accurately controlled manufacturing processes are necessary for continuous delivery of the finished product. Electric power combined with the flexibility of standard industrial devices, offers the medium by which this is accomplished. At the main switchboard, 440-volt power is broken down into ten feeder circuits with provision for five extra feeders to meet future requirements. Seven of these feeders furnish the energy directly to process motors and conveying equipment. Of the remaining three, two supply switchboards in other parts of the plant, while the third supplies the lighting circuits. At one of the two latter mentioned switchboards a feeder is taken off for a third board which supplies the 15-cycle energy to the screen magnets.

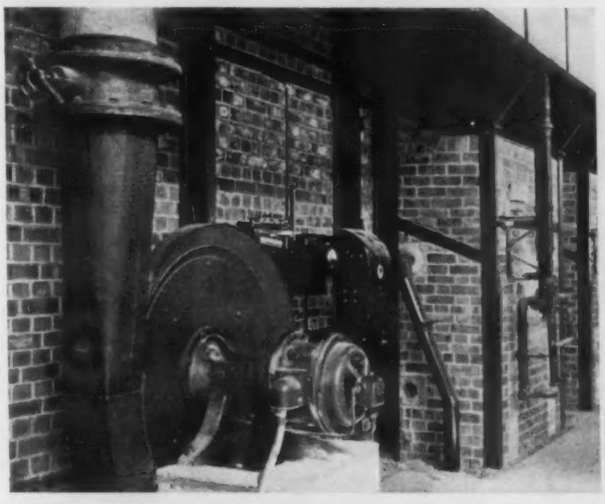


Fig. 3. Motor-driven centrifugal compressor supplying the air necessary for the combustion within the kiln. This apparatus operates on a severe duty cycle, often running for days at a time without shut-down. At the right may be seen the air-flow gages and furnace arrangement of the kiln

The main switchboard is of steel construction, having oil switch control for main feeder and heavy subfeeder circuits, and fused switch control for group motor feeders and subfeeders of a minor character. Although the present size of the load does not bring it within the range of the power factor clauses in the existing rate schedule, provision is made for the future installation of reactive metering when full plant capacity is installed. Service switchboards also consist of steel assemblies mounting fused disconnecting switches, with magnetic contactors mounted on the rear of the panel. This type is used when motors are installed on individual circuits,

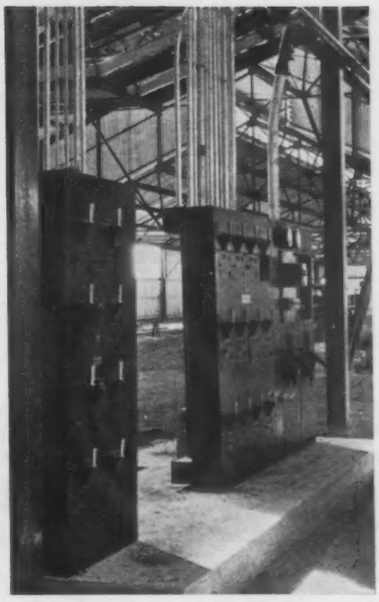


Fig. 4. View of the main switchboard showing the steel-enclosed construction and the neat, compact arrangement of the circuit disconnecting switches. Open-type conduits lead to the enclosed bus gutters at the top and bottom of the rear panel. Space conservation and accessibility are features of this installation

but when motors are installed on group circuits, magnetic contactors and pushbuttons are mounted locally near the motors. Group feeders are run in full wire size to the disconnecting switch, which precedes the magnetic contactors and pushbuttons are mounted locally run to the motors in sizes determined by the National Electrical Code.

With the exception of two, all motors within the plant are started with pushbutton magnetic control. In the case of the centrifugal compressors for the kiln and the 60-hp. motor drive on the main grinding apparatus, the starting is done by hand compensators. All conveyor trains are completely interlocked, so that motors must be started in proper sequence and if any motor of that trains drops out from overload or undervoltage, all motors behind it in the train are automatically stopped. In addition to this interlocking, emergency pushbuttons are connected in the trip circuit of the terminal motor of each conveyor train. By pressing these emergency buttons, the entire train can be stopped from each of these control points. This provision not only promotes personal safety of the operators but also prevents the overfilling of tanks and storage bins when observed by an operator from the floor. All motors in the kiln and driers are equipped with undervoltage time-delay attachments to prevent motor stopping as the result of momentary fluctuations in power.

A complete system of thermostatic and temperature indicating equipment is also provided for controlling combustion conditions.

An interesting feature of the conveyor system whereby three shuttle conveyors facilitate delivery material to the various receiving bins of the plant, is installed. Motors, being integral with the conveyors, must not only be reversible in rotation but also must travel back and forth with the carriage of the conveyor itself. This function is accomplished by providing the motor with power leads of 3-conductor flexible cords and two heavy-duty plugs and receptacles. These receptacles are so wired as to produce opposite rotation of the motor, the slack of the portable cord being taken up on a loose system of pulleys, riding on a steel messenger cable fastened to the roof trusses.

Push botton control for the magnetic contactors is mounted adjacent to the receptacle and, as a safety feature, there is a red signal light which warns the opera-

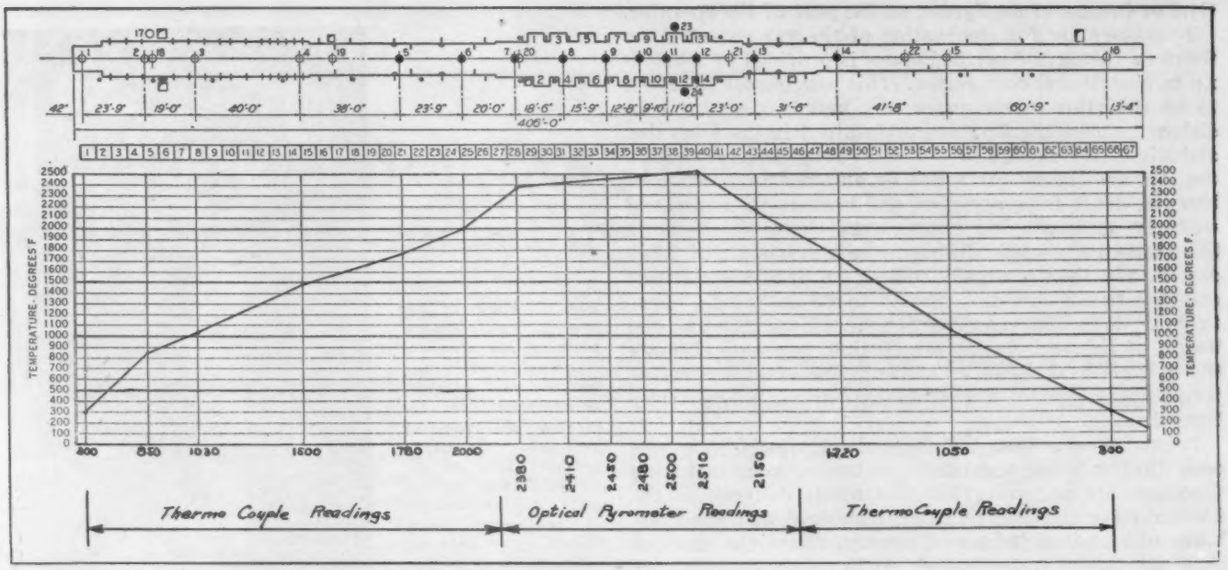


Fig. 5. Profile of temperatures within the main kiln. By suitable arrangement of burners and automatically controlled combustion equipment, this temperature gradient is maintained to produce a perfectly fired product

tor whether the magnetic contactor is closed or not, so that the plug may never be inserted when the receptacle is energized. This safety light consists of a 440-volt resistor in series with an 18-volt signal lamp which is flush mounted in an iron-clad box. By means of the interlocking motor control on the conveyor motors, and the flexibility provided by the three shuttle conveyors, the material distributing in this plant is brought up to a maximum of efficiency. Not only can abnormal conditions of operation, such as overloading, spilling, and jamming be prevented, but also rapid starting and stopping of the entire plant is accomplished by this method.

Plant lighting is fed from several transformers connected to the 440-volt power system. Outlets are all arranged on a 115-230-volt three-wire system, and consist of standard R.L.M. dome reflectors of size and spacing suitable to the character of the work in each department. Certain general lighting circuits are installed throughout the plant so that they may be controlled by three-way switches, enabling night watchmen and overtime operators to turn these lights on and off from different entrances to the plant. The electrical system of this installation was designed with a view to minimizing the time in starting the plant and providing complete automatic protection against production troubles. While compact and economical in design, the whole installation is readily accessible and completely protects the operators against personal hazards and the plant against accidental shutdown. Accomplished with combinations of standard electrical apparatus, this installation offers a splendid example of economic power application.

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Large Pumping Unit Insures Reno Water Supply

By L. O. B. Lindstrom
General Electric Company, San Francisco

Exterior view of pump house showing the slotted construction of the roof and rear wall to facilitate removal of the equipment. Note the absence of overhead services

CITIZENS of Reno and Sparks, Nev., need not fear for an adequate supply of water for domestic purposes since the Sierra Pacific Power Company recently put into operation one of the largest deep-well pumps in the country for city water supply. Located at Reno, the well will be used as the source of supply during times when the nearby mountain streams on the eastern Sierra slope, which furnish the normal source of supply, have a flow insufficient to supply the requirements of the two cities.

Conditions under which this unit operates impose a heavy-duty cycle on the equipment. Rated for a capacity of 5,500,000 gal. per day, the pump normally is called upon to deliver 4,500,000 gal. per day, pumping from a depth averaging 100 ft. against the 80-100 lb. static water pressure of the city reservoir. This is equivalent to a total head on the pump of approximately 350 ft. The water level in the well when the pump is not operating is 42 ft. below the surface, but the draw-down during pumping periods lowers this to approximately 105 ft., the maximum draw-down recorded being 128 ft.

A deep-well turbine pump driven by a 400-hp., 1,180-r.p.m., 4,000-volt vertical hollow-shaft General Electric motor was installed to meet these requirements. This motor is the largest of its type yet built and is designed for a low starting current so that it may be thrown directly across the line with an oil-immersed magnetic switch.

Aside from the size of the unit, there are several interesting features in connection with the electrical

installation. In addition to the conventional overload and under-voltage protection, a temperature relay installed in the top bearing of the motor prevents possible damage from over-heating at that point by shutting down the pump after the safe temperature limit has been reached. As the top bearing of the motor carries the weight of the rotating parts of the entire unit, this bearing is cooled by water taken directly from the pump discharge. Thus failure of pumping water will also shut down the pump. Accidental unscrewing of the pump connections is prevented by a CR-2904 phase-reversal relay which operates to shut off the motor in case of power phase reversal.

A concrete building, designed with a slit along the roof directly above the pump and down one side to the door, houses the unit and associated apparatus. This feature of the design facilitates the removal of the motor and pump, it being normally covered with a metal hood

Vertical, hollowshaft motor driving the deep-well pumping unit. Designed for low starting current, it is started on full-line voltage with the oil-immersed, magnetic switch shown at the left

which has two covered ventilating openings. Power is supplied through a 4,000-volt, three-conductor armored cable with indoor and outdoor potheads, terminating on the interior at the oil-immersed magnetic switch. This eliminates the possibility of contact with high voltage as all the equipment is metal encased. Before the pumped water enters the main it is metered with a Bailey integrating and recording water meter, which with electrical metering on the motor gives a continuous record of output and efficiency.

As the pumping station is located on a main highway, floodlighting is used to advantage in making the neat, attractive appearance of the installation as conspicuous by night as it is by day. Two 250-watt floodlighting units, mounted on small concrete piers located on 45-deg. diagonals 20 ft. from the front corners of the pump house, supply the necessary illumination.

Where Is the Blacksmith Now?

Motor Dealer Faces Same Situation That Blacksmith Faced in Past and Must Readjust or Be Eliminated, Thinks This Progressive Specialist

MOTOR shops today, with the almost complete unit motorization of machinery, are in the same critical situation that faced the blacksmith some years ago when the automobile began to be a practical substitute for horse-drawn transportation. Already many motor shops have allowed air conditioning to get away from them, and are allowing other new business substitutes for the former motor trade they enjoyed to slip by them. A change is needed in the motor shop business if it is to survive.

Thus reasons Frank Broiles, president of the International Electric and Machinery Company, pioneer motor specialist of Los Angeles—the man who started the Motor Section of the California Electragists which later became a national movement—as he describes some of the changes his own company is making to adjust to the times. These adjustments constitute a method of placing one's house in order which contains many constructive suggestions for other motor shops.

Of first importance is the sales organization set-up. In this company, besides Mr. Broiles, there is Frank Warren, sales manager, Harry Janssen, engineer, and George Low, engineering salesman. These, together with the trouble man, sit together in weekly sales meetings, some of them directed by sales promotion experts. The trouble man brings the practical angle into the meetings, and gives sales leads from his observations while servicing. He follows up all sales to guarantee satisfactory running, trains plant operators in correct operation, checks relays, oiling, drive, and explains features and precautions to the customer. Thus he becomes an invaluable sales aid. No trouble man is ever given the position until he has been six years with the company.

Every time a salesman goes out to make calls he is primed with something new to talk about. The calls he makes are not routine, therefore. They bring new ideas to customers. They are welcomed, looked forward to.

Second in importance in the scheme is the personnel organization. The firm has an efficient credit department. This is of prime importance. Only less important is the accounting department, which keeps accurate costs on all departments and activities. The shop department is kept entirely separate from the installation department, under separate foremen. Deliveries are scheduled twice daily. The driver picks up the articles at a specified place, tagged with instructions as to delivery and collections. He does so automatically. An article there is ready for delivery.

Practically all employees own an interest in the company. After dividends are paid, reserves are cared for and excess is divided among employees. This makes for intense personal interest in the success of the concern.

A third feature of interest is the company's advertising. This begins with a neon window sign seen by passing motorists day and night. Special useful novelties, such as rulers, calendar cards, and similar devices, have proved surprisingly good advertising reminders. Occasional mailing pieces and sales letters are also used. A chart of standard turn-in values on used motors has

Gold seal decalcomania emblem that is placed on every rebuilt motor turned out

Sales floor of the firm, showing shelf and pulley stock at the extreme left, shop at the rear, lighting demonstration at the center rear, rebuilt stock on the floor, and at the left the raised platform on which are mounted various types of motors for display and operation. Frank Warren, sales manager, and Frank Broiles, president, are seen seated at the desk

proved effective, especially with pump men and outside dealers. The gold seal used to identify guaranteed rebuilt motors is discussed elsewhere.

The fourth item is the active demonstration of equipment. At the entrance to the display room is a steel-framed, live, deadfront panelboard, equipped with line starters, switches and fuses, circuit breaker switches and meters, by means of which a number of motors on a raised platform on the floor may be run. Each unit represents a modern type of motor fitted to handle special duty.

At the rear of the display floor various types of lighting units are mounted, each of which can be demonstrated either at full voltage or under voltage to show loss in efficiency due to line loss.

A fifth item of importance is the maintenance of adequate stocks of pulleys, fittings, belting, repair parts, and merchandise used in industrial plants. An agency and service department for electric tools is a sales specialty that is proving of increasing value.

Last, but not least by any means, is the handling of motors taken in either for repair for a customer or for rebuilding for sale. All motors older than five years are scrapped, broken up for old metal, and junked. Last year over 3,000 hp. in old motors was thus junked, 1,000 hp. of which could have been placed back on the market as in running order. Such equipment, however, is a drag on the industry, even as is the broken-down automobile on the automobile industry. The public is better off buying good, modern rebuilt motors in place of rewinding equipment over six years old, Mr. Broiles shows his customers, considering delivery and service charges.

When a motor comes into the shop it goes first to the test department, then is torn down to reach the defective part, and is sent to the machine shop or winding department, as indicated. After rebuilding, it is given thorough test and is labeled with a gold seal carrying a year's guarantee. The bill of sale gives the date from which the guarantee is effective. This feature, adapted from the automobile industry, is advertised extensively.

"I would like to see high standards maintained in rebuilt motor work," declares Mr. Broiles. "Our reputation as motor specialists is at stake and we can never expect to convince industrial plants of the desirability of having us take care of their maintenance work for them if we do not all accord to the rebuilt motor the same care and quality we give our preferred customers. Motors taken in should be kept segregated from new and rebuilt motors until thoroughly checked, rebuilt, and stamped with a seal guaranteeing performance."

Open Wire Heat Helps Plants Grow

BESIDES developing trench-laid wire for heating the soil, industrial heating specialists of the Southern California Edison Company Ltd. have made use of open runs of conductor for heating greenhouses and mushroom cultivation houses. In the instance of the installation pictured, two 220-volt circuits with No. 12 American wire gage were used, one circuit for the large center table and the other for the two outer tables. In each case the wire is placed beneath the table so that the heat evolved in the passage of the current will radiate upwards through the plants on the tables.

About 800 ft. of the conductor was used in this installation, which produces a load of approximately 7.5 kw. per circuit, or 15.1 in the house. The arrangement will produce a temperature rise of 17 deg. F. in addition to the retention qualities of the greenhouse itself, which makes such a practice feasible in sections where temperatures seldom drop below 20 deg. F., as propagationists hold 45 deg. to be about the minimum temperature in which plants thrive.

This heating installation, without regular equipment, is both serviceable and cheap; the investment cost is about $90 as compared with an approximate $400 cost for a steam unit.

Open runs of conductor heat this greenhouse. Smaller tables are on either side of the larger center table

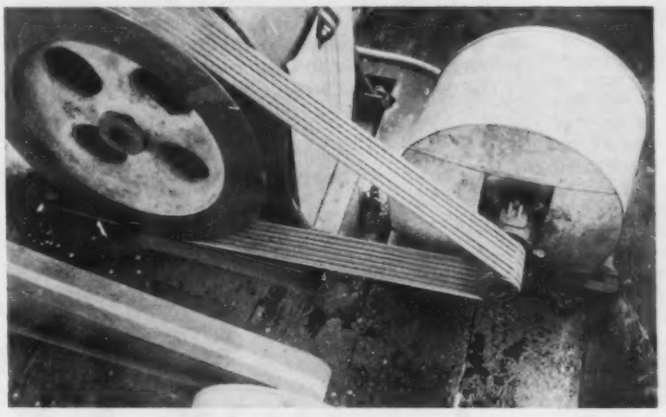
Cracks Ice And Shoots It

IN FISHING for tuna, barracuda, and other large sea game of that type, small fish are used as bait. These must be captured and preserved with crushed ice until used.

For many years, bait boats have been iced practically by hand, a practice expensive and time-wasteful. The California Electrical Works, of San Diego, Calif., was asked to design and electrify an ice loading system for a large fishing company; its installation has been highly satisfactory.

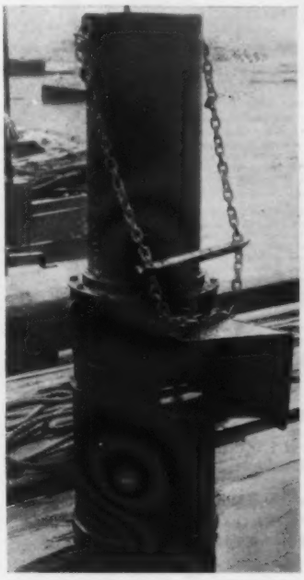
Frank Sloan, who designed the pictured system, had seen one using a funnel type distributor, but the unit of his design is more flexible, can get into a smaller space, and shoot the ice in its place rather than drop it. This is accomplished by a fan of flat metal plate with vanes on the top; ice drops down on the plate and is whirled through the outlet. Three-phase, 220-volt current is used, the frame being grounded by a fourth wire. A three-wire lock plug is used on the top.

Above: Ice is loaded on the lower platform and is carried to the crusher, at the top, by the conveyor, which is driven by a 3-hp. motor. Eight 300-lb. cakes per minute is the conveyor capacity. From the crusher, ice is routed through the distributor which may be seen to the rear



Above: A 10-hp. metal-shielded motor runs the crusher. Grooves in the heavy flywheel seat the seven V-shaped belts. The size of the flywheel reduces the speed from 1,800 to 225 r.p.m. While the belt on the crusher drive will not slip, the belt on the conveyor drive (left foreground) is designed to slip in case of a jamming of ice cakes

Below: The first distributor proved fairly satisfactory although it was frequently overloaded, but it lacked speed. A new unit was designed, with a 10-hp. motor placed below the fan. In other details, also, the new unit is different; the ice comes in directly at the top and the electric leads are taken out at the botom. The motor in either case does not overheat because of the presence of the ice



Right: The first distributor was made of 3/16-in. galvanized metal, arc welded together. A 5-hp., 1,800-r.p.m. squirrel cage motor is mounted on a tripod at the top of the unit and totally enclosed. Leads are brought out through a hollow shaft on the top on which the outer casings pivot. Rollers support the bottom of the outer casing and make it easy to turn as desired to shoot the ice where wanted. The shaft is connected to the fan by a flexible coupling below the motor

The metal distributor pipe and the distributor itself are raised and lowered from an overhead boom, but the actual placing of the ice is governed by the mouth, or outlet, which turns completely around

Brawley (Calif.) Municipal Plant Proposal Defeated at Polls

A PROPOSED bond issue to finance a municipal electric distribution system in Brawley, Calif., sprung as a surprise nine days before an election set for May 21, became so much the center of attention that five proposed civic improvement bond issues on the ballot were lost sight of and consequently failed to receive the approval of the voters, while the intensive campaign waged by the opponents of the power measure resulted in its defeat.

The center of the controversy was a proposed measure to issue $150,000 in bonds for the building of an electric distribution system. This also involved the ultimate purchase of $400,000 worth of Diesel engines for the generation of power, which necessarily would have put the municipality in competition with The Southern Sierras Power Company, which serves Brawley. On the ballot were five other propositions covering the proposed issuance of bonds totaling $135,000 for a city hall, a fire house, water system improvements, sewer improvements, and a water tank. A two-thirds majority was necessary for the passage of any of these measures. So intense was the interest in the power bond proposition that the other issues were forgotten, and as a result none passed.

From the date of the passing of the ordinance calling for an election, there were only nine days left in which to carry on a campaign. The power company opposed the proposition from the standpoint of the taxpayer and the home-owner and directed attention to the fact that the city of Brawley has been unable to manage its water and other utilities in an efficient manner and questioned its ability to make good on a business so highly technical as that of the power business, especially as it would have an established power company to compete with—one giving fair rates.

One of the features of the campaign was the interviewing of voters by salesmen from the power company's commercial department. Another was the advertising done by the company. In one of the most effective advertisements (reproduced herewith) an appeal was made to the mother love of the women of Brawley and the fact was emphasized that the city had failed in its fundamental obligation of giving its people pure water. Another advertisement stressed the fact that the precarious type of power which would probably be forthcoming from the small municipality would not be as dependable as that to which they had become accustomed. The final appeal was made by F. O. Dolson, vice-president and general manager, in an address to the Woman's Club of Brawley. As an indication of the keen interest shown by the women, he was showered with questions for 40 minutes following his talk. To the vote of the women is attributed in large measure the defeat of the power bond proposition.

When the votes were finally counted, returns on the proposed power measure stood: "Yes," 385, 41 per cent; "No," 554, 59 per cent.

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Tacoma to Continue Appliance Selling

By a unanimous vote of the City Council of Tacoma, that body has refused to discontinue the sale and servicing of electric ranges and other electric appliances in the city of Tacoma, with the understanding on the part of Mayor M. G. Tennant and Commissioner C. H. Votaw that, if the audit of city accounts now under way discloses that the city is losing money in this line of activity, the matter will be reopened.

The question has been raised by petition of retail merchants, wholesalers, the Chamber of Commerce, and others, seeking to get the city out of the merchandising business. The Federation of Improvement Clubs stood solidly back of the city's position to continue the sale, declaring that the "attempts of the power trust to embarrass the municipal power utility and hamper it were at the bottom of the movement."

Mayor M. G. Tennant states that figures now available show that if there is any loss, it is in servicing appliances free during the first year after sale.

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PUGET SOUND CO. ORGANIZATION CHANGE—Among the changes made in the organization of the Puget Sound Power & Light Company, Seattle, following the installation of J. F. McLaughlin as president of the company, is the creation of a separate division of power supply set up to handle generation and transmission, with John Harisberger as manager. The light and power department in the central division now includes engineering, construction and operation. M. T. Crawford, formerly superintendent of distribution, is general superintendent in the light and power department; J. Hellenthal is electrical engineer; B. R. Shutt is superintendent of distribution; W. C. Whipple is superintendent of substations, and A. W. Mathis is superintendent of system operation.

To the Mothers of Brawley Who Want Health for Their Children

Is it more important that your child should have pure drinking water or that the city of Brawley should embark in the private business of manufacturing and distributing electric power?

There are periods of the year when the city's domestic water is so thick that it will scarcely run from the hydrant. But is there now anything seriously wrong with the electricity that cooks your meals, runs your refrigerator, and makes possible all of the wonderful electrical appliances which have taken the drudgery out of the home?

Is it good business to fail to plan for a filtration of your drinking water but to ask the taxpayers of Brawley to spend $350,000 to experiment with your electrical service which is already satisfactory with rates constantly decreasing.

What would your home be like with poor water and poor electric service, both? Isn't it logical to say that a city not able to furnish its people with an adequate pure domestic water supply has no right to attempt to serve any other public utility?

Suppose a private water company were serving your home with mud at any time of the year. Would you turn around and give that same company the right to spend more than a half million dollars of your money for a competitive electric service when you were already receiving satisfactory service from another source?

David S. Bromley

Superintendent,

The Southern Sierras Power Company.

Listen in over Radio Station KXO every night except Sunday at 9:30 p. m.

Mothers are appealed to in this advertisement not to put their electric service in the hands of a city management that has already proved its incompetence by failing to provide a pure domestic water supply

Hoover Dam Power Line Ready This Month

From Victorville, Calif., to Hoover Dam the new 132-kv. steel tower line of The Southern Sierras Power Company is completed. Finishing touches are being put on the construction of the substation at the dam site and work is being rushed on the line from Victorville to San Bernardino, Calif., to complete the entire job and test it out some time shortly after June 1.

Work started on the 193 miles of line from the Victor substation on Jan. 1, 1931. On April 25 it was tied in at the substation at the dam site. Work was well organized with four camps serving the crews. Three camps were in operation with a fourth camp moving to the next location. Besides these were crews of men drilling the rock holes preparatory to the arrival of the erecting crews. The line is a steel-tower, single circuit line which will be operated at 88 kv. during the construction work, and then will be used to feed back from the Hoover Dam power house at 132 kv.

In spite of the fact that work could not start on the substation until a roadway was constructed to the dam site itself, and that construction did not begin until March 23, the substation is now practically ready for test. From the roadway the Southern Sierras company had to build 1¾ miles of road through solid rock to reach the substation site. June 25 has been set as the deadline for the operation but it is expected the line will be tested far in advance of that time.

At the substation voltage will be stepped down to 2.2 kv. for operations at the dam and to 3.3 kv. for distribution to the town seven miles away.

The 32-mile line connecting the San Bernardino plant with the Victor substation, five miles out of Victorville, is also nearing completion. This line is being built over the San Bernardino Mountains.

At the San Bernardino plant a second 15,000-kw. condenser with transformer equipment is being installed to take care of the new load. Service for Boulder Dam will come off the main buses of the company's system at the San Bernardino plant.

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Lighting and Power Rates Reduced by So. Sierras Co.

The Southern Sierras Power Company, Riverside, Calif., voluntarily reduced its L-1 general lighting electric schedule last month in the amount of $25,600 per year, $16,800 of which applies to Imperial Valley, and $8,800 to the remainder of its system. The company also reduced its P-30 general power schedule in the amount of $13,600, applicable to Imperial Valley.

These reductions are in addition to lowered rates applying to its combination lighting, heating, and cooking service put into effect by the Southern Sierras company April 15 and amounting to a reduction of $42,875. This makes a total of $82,075 reduction by this utility during the past two months.

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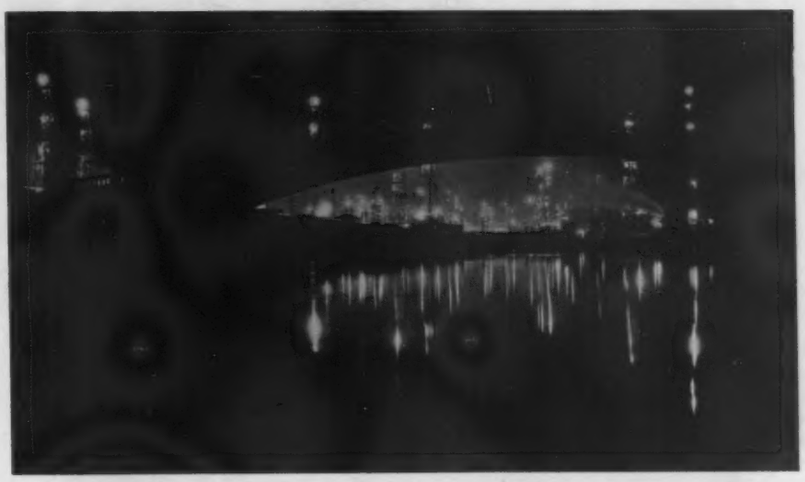
Venice Transformed



Not so sightly in the daytime, the myriad of oil derricks at the Venice (Calif.) oil field, transformed by light, give the city a carnival appearance at night

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Arizona Loser in Hoover Dam Injunction Suit

Refusing Arizona an injunction which would halt work on Boulder Dam, and upholding the constitutionality of the law under which the great project is being built, the U. S. Supreme Court, with Justice McReynolds alone dissenting, on May 18 made known its decision on the important Colorado River case. The decision largely constitutes a victory for the defendant states.

Filing of a suit calling upon the court to make "an equitable apportionment of the Colorado River waters" is expected immediately as an outcome of a meeting of Arizona's past and present Colorado River commissioners following the decision. Whether or not cognizance is taken of this suit, commissioners feel that, having filed it, no charge can then be made that Arizona has failed to exercise diligence in protecting its rights, thus nullifying any future action taken to recover damages from the other states interested.

At the time of the Supreme Court's decision, Arizona was granted the right to resue if at some future time she can show her rights are being impaired by the building of the dam. Such a suit would be unprejudiced by the recent action.

Three phases were cleared by the decision—the right of the federal government to build the dam, the decision that it is a "navigable dam," and the decision that Arizona is not subject to the Santa Fe pact, under which allocation of waters was made.

Los Angeles Will Not Vote on Power Bonds

The Los Angeles City Council on May 12 voted unanimously to deny the request of the Water and Power Commission to submit a $15,300,000 power bond issue to voters at a city election called for June 2. The request was refused on the ground that with only three weeks in which to conduct a campaign, the issue would be defeated.

The Water and Power Commission had adopted resolutions asking the council to put on the ballot propositions in the amounts of $7,000,000 for construction of a steam-electric generating plant, $2,000,000 for the acquisition of a right-of-way for the proposed transmission line to bring power to the city from Hoover Dam, and $6,300,000 for the betterment and extension of the present municipal power system.

Los Angeles voters last fall turned down a power bond proposition of $13,300,000 which included the transmission line and general improvement items but did not include funds for the present proposed steam plant.

Directors of the Metropolitan Water District of Southern California recently adopted a resolution expressing intention to submit a bond issue for construction of an aqueduct from the Colorado River as soon as practicable after Sept. 1, this year. No amount was stated in the resolution, although unofficial estimates place the amount between $200,000,000 and $220,000,000.

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PUBLIC OWNERSHIP MEASURE PASSED IN NEW MEXICO—An act of the 1931 Legislature in New Mexico makes it possible for municipalities to grant franchises for public utilities, providing 10 per cent of the voting population petition for such a move and the franchise is later approved at the polls.

Spokane Company Leaders Memorialized

THE RESTORATION OF NATIVE TREES AND SHRUBS ON BOTH BANKS OF THE RIVER BESIDE THE POWER FALLS IS IN MEMORY OF TWO FRIENDS
WILLIAM AUGUSTUS WHITE
1843 – 1927
AND
DAVID LYNDE HUNTINGTON
1870 – 1929
WHO FOR MANY YEARS DIRECTED THE DEVELOPMENT OF THE WASHINGTON WATER POWER COMPANY
1930

In honor of William Augustus White and David Lynde Huntington, former chairman of the board and president, respectively, of The Washington Water Power Company, this bronze plaque has been affixed to a boulder in the recently completed Memorial Park at Spokane Falls, in the heart of the city of Spokane

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Los Angeles Water and Power Budget Passed

Providing for extensions and improvements to the city-owned water and electric system and for completion of land purchases in Owens Valley, the 1931-32 budget of the Los Angeles Department of Water and Power has just been approved by the Board of Water and Power Commissioners.

The budget, calling for $61,000,000, is the largest ever submitted by the Department of Water and Power, according to Arthur Strasburger, president of the board of commissioners.

Provision is made for $7,500,000 to be paid into the general sinking fund of the city for bond interest and redemption payments. Labor and materials on projects of this department will require $33,500,000; $16,500,000 will go for labor and $17,000,000 for materials.

In approving the budget the commissioners have contemplated the following extensions and betterments to the water and power systems:

Water: Enlargement of the aqueduct capacity, construction of new storage reservoirs, and enlargement of existing reservoirs, extensive well drilling in Owens Valley and the Los Angeles area, seven new pumping plants in Los Angeles, trunk lines from pumping plants to centers of use, six distributing reservoirs and tanks, and a filtration plant at the harbor.

Power: Improvements to the electric system will include installation of the third unit in power plant number two, providing 20,500-hp. capacity additional to the electric system; a new power distribution station in Hollywood, and extensions of underground electric conduits in Hollywood, Los Angeles and San Pedro.

Purchase of all town properties in Owens Valley will be completed as expeditiously as possible.

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Water Shortage More Serious in California

The increasing gravity of the water shortage in California is emphasized by reports issued last month by the State Division of Water Resources and the California Railroad Commission.

Lack of normal precipitation in April warrants a downward modification of the Division of Water Resources estimates (based on available precipitation data for the first three months of the year), as reported in ELECTRICAL WEST, May 1, 1931, p. 227. The estimated seasonal run-off for the Upper Sacramento River is reduced to 34 per cent or 2 per cent less than that of 1924; for the entire Sacramento Basin, including tributaries, the revised estimate is 30 per cent or the same as 1924; and for the entire Sacramento-San Joaquin drainage, including tributaries, 30 per cent, or 2 per cent above the 1924 percentage.

The report of the Railroad Commission shows that "in that section of the state approximately north of the Tehachapi the rainfall has been much below normal, ranging from about 40 to 60 per cent in general, with some areas showing as low as about 35 per cent and others as high as about 65 per cent. The consequent stream flow has been in general in volumes and ratios below those representing rainfall. As an indication of conditions, the run-off of the Sacramento River at Red Bluff, and the San Joaquin River at Friant, may be taken. The total flow of the Sacramento River at Red Bluff from Oct. 1, 1930, to April 1, 1931, was 1,997,000 acre-ft. and the flow of the San Joaquin at Friant for the same period was 207,000 acre-ft. These volumes represent 20 per cent and 10 per cent of the normal seasonal flow as estimated by the State Department of Public Works for the 50 seasons from 1871-72 to 1920-21. The run-off of the Sacramento for the season of 1923-24 at Red Bluff was 2,970,000 acre-ft., or 30 per cent of the normal, and the runoff of the San Joaquin at Friant was 507,000 acre-ft., or 25 per cent of the normal. The season of 1923-24 was that of minimum seasonal run-off since 1889, when stream flow records were commenced.

"Conditions in the Owens Valley, Los Angeles, San Gabriel, and Santa Ana drainage areas, and Santa Clara Valley, are of the same general character as over the remainder of the state, but reports indicate that while stream flow will be low, the demand will be met by supplemental pumping from underground basins. On the Sweetwater River in San Diego County the run-off has been low, but pumping from ground waters will be resorted to in order to meet the demand. Late rains should be of material benefit to the southern portion of the state."

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Alameda (Calif.) Light Department Reorganized

Abolition of the position of Alameda (Calif.) municipal electric light plant superintendent, formerly held by J. B. Kahn, and other personnel changes followed closely on the recent election of Engineer-Mayor W. H. Henning and his appointment of another engineer, H. S. Cloak, to the public utilities board. Mr. Cloak subsequently was made chairman of the board, of which Howard Baxter and Neil B. Pierson, city manager, are members. Chief election issue was the light plant reorganization.

The new public utilities board secretary, succeeding R. M. Harvey, is a former manufacturers' representative in San Francisco, Burton Y. Gibson, who also becomes manager of the light plant in charge of commercial development and office management. Duties of the former superintendent devolve on B. R. Fritz, efficiency expert appointed to investigate personnel and conduct of the light plant.

In a statement to ELECTRICAL WEST Mr. Gibson, who has been identified with electric range promotion and sales for many years, declared he would put in effect a policy of load building, cooperation with dealers (because the city

will not enter the merchandising business), co-operation with manufacturers on the development of new electrical markets, and a change in employee attitude from one discouraging electrical appliances to one actively favoring them.

"In fact," declared Mr. Gibson, "as one who has believed in the efficiency of private business management all my life, I want to see the Alameda plant run as nearly like a good, active, private utility as possible. I invite my former associates in the electrical industry to help make the Alameda system a good market for electrical equipment, and thus help me build load."

The City of Alameda purchases its electricity from the Pacific Gas and Electric Company.

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Wages Cut By Pepco

In accordance with a general notification of the intent to reduce all salaries and wages in the Pacific Northwest Public Service Company and the Portland General Electric Company, Portland, issued by Franklin T. Griffith, president of these companies, all salaries and wages not affected by Union agreement were reduced 10 per cent, effective May 1. The extent of the cut desired for light and power employees operating under Union agreement has not yet been determined, and official notification has not been given to the Union.

As regards employees of the street railway department of the Pacific Northwest Public Service Company, the men were notified in April that a 10 per cent reduction would be effective May 1. The Union refused to accept this cut and in a subsequent conference with company officials agreement to arbitrate was reached. The board of arbitration is expected to reach a decision by May 20 and the decision will be retroactive to May 1.

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Tunnel Contract Let for Oak Grove Project

The complete development of the Oak Grove project as originally planned took another step forward last month, when the Pacific Northwest Public Service Company, Portland, let a contract to Sullivan & Doyle, Portland contractors, for 3,500 ft. of tunnel between the main fork of the Clackamas River and the Oak Grove Creek. The tunnel, which is to be 10 ft. in diameter, ultimately will be 3.7 miles long, and will deliver water from the main fork of the river to the present intake of the Oak Grove plant. The present contract will complete all the work to be done on the project this year. It is planned to take three years to complete the tunnel.

When first placed in service, the tunnel will be used as an open, unlined conduit, capable of carrying about 400 sec.-ft. of water. Later, when the main fork of the Clackamas River is dammed to supply storage, the tunnel will be lined, and will operate as a pressure conduit.

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Tacoma Ready to Study Skokomish River

Plans for preliminary investigations on the south fork of the Skokomish River, in connection with the city of Tacoma's proposed diversion of waters of the river, as asked for by the Federal Power Commission, have been completed by Commissioner Ira S. Davisson of the public utilities department.

The government has requested that the city make engineering studies of the dam site, impounding basin, and stream flow above and below the proposed dam; that it make a study of the ground waters in the lower valley of the Skokomish River, where the farmers claim sub-irrigation occurs from the river; and that it make a study of fish life in the river. The hydraulic engineering studies on the south fork will be done under the supervision of J. V. Gongwer, who has been superintendent of hydraulic design and construction on the second unit of the Cushman power project, now nearing completion. The study of the valley goundwaters will be made under the direction of Ross K. Tiffany, consulting engineer of Olympia, former state supervisor of hydraulics.

It is expected that the results of this study will have important bearing upon the suit of the farmers for additional damages for diversion of the waters of the north fork, as well as on their damages to result from diversion of the waters of the south fork.

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McGraw Awards for Electrical Men

Consisting this year, as in the past, of a Manufacturers Medal, a Wholesalers Medal, a Contractor-Dealer Medal, and a Medal for Co-operation, the James H. McGraw awards for electrical men established seven years ago will, as before, be accompanied by a purse of $100 in gold.

Recipients of the awards will be selected by a committee appointed for the purpose by The Society for Electrical Development, Inc., New York. The Manufacturers Medal will be presented at the fall meeting of the National Electrical Manufacturers Association; the Wholesalers Medal at the winter meeting of the National Electrical Wholesalers Association; the Contractor-Dealer Medal at the annual convention of the Association of Electragists - International; and the Medal for Co-operation at a special meeting arranged by the S.E.D. at an appropriate time.

The two most recent awards of the Medal for Co-operation have been made to electrical men on the Pacific Coast. Henry H. Courtright, president and manager, Valley Electrical Supply Company, Fresno, received it in 1928, and in 1930 the medal was presented posthumously to Charles T. Hutchinson, late president of the McGraw-Hill Company of California.

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Kit for Range Demonstrators' Utensils

HOME economists of the Southern California Edison Company, Ltd., have been provided with this standard utensil demonstration kit to carry with them on their visits to the homes of electric range users. The case, weighing 20 lb. when packed and measuring 21 x 21 x 7 in., contains the kitchen utensils which the average housewife uses in preparing foods for her range.

As Edison company home economists are provided with automobiles for making their calls upon range users, it is necessary for them to carry the utensil case only between their cars and the homes they visit.

N. E. L. A.

Problems of the Day Will Be N.E.L.A. Topics

Because of business conditions generally and the unusual amount of public interest in utility problems at this time, particular attention will be paid at the National Electric Light Association convention, opening June 9 in Atlantic City, N. J., to such questions as public and trade relations, the government in business, the future of the light and power industry, potential markets for electrical energy, the public utilities as shock absorbers, public utility advertising, mass production, rate structures, and regulation.

Committee meetings and a president's reception will precede the convention on June 8. General sessions will be held on the mornings of the 9th, 10th, 11th, and 12th, the afternoons being devoted to sessions of the engineering, accounting, commercial, and public relations national sections.

Prizes in the men's and women's national employee speaking contests, consisting of $1,000, $500, and $250, will be awarded by W. S. Vivian, chairman of the public speaking committee, at the women's committee meeting on Monday morning, June 8.

A. I. E. E.

A.I.E.E. Completing Plans For Tahoe Convention

C. E. Grunsky, of San Francisco, president of the American Engineering Council, will be the feature speaker at the convention of the American Institute of Electrical Engineers at Tahoe Tavern, Lake Tahoe, Calif., Aug. 25-28.

Fourteen technical papers will be presented, and the general convention committee is enthusiastic about the possibilities for constructive work.

As plans for the program are being completed, announcement is made that it has been arranged that members may spend the week preceding or following the convention at the Tavern at the same special rates of $7 to $8 per day per person that will apply during the convention.

For those traveling by automobile, several scenic routes are available. Railroad transportation is by the Overland route of the Southern Pacific. Low sixteen-day round-trip fares from points in California will be available; summer round-trip fares from points in Oregon, Washington, and Mountain states are correspondingly low to San Francisco, and stopover privileges are available at Sacramento or Roseville, the points of connection with the Lake Tahoe branch.

Early indications presage a large attendance at the convention.

P. C. E. A.

Del Monte Convention Program Outlined

Even the dramatized, animated and illustrated convention of 1929 will be outdone in the graphic method of presentation to be employed at the Pacific Coast Electrical Association convention at Del Monte, Calif., June 24-27, according to the many committees in charge of this year's program features. Every item on the program will be told with the double emphasis of sight and sound, and from the floodlighting of the grounds to the final banquet, new features of presentation are planned.

This dramatic method of presentation, besides being far more entertaining to the convention audiences, has also been found to insure larger attendance at meetings and to drive home the thoughts presented in a more realistic manner than could speeches alone.

In this way each of the sections, representing a department of light and power company operation, will present to the remainder of the industry the ideas or plans considered of greatest significance by it. Thus the program becomes a concentrated essence of the best thought and plan of the industry, delivered in doses which should not fail to make them immediately effective.

At the time of going to press, a complete program of the convention activities was unavailable for publication. The following tentative program is correct in its essential details, including the time assignment for general and parallel sessions:

Tentative Program

Pacific Coast Electrical Association Convention at Del Monte, Calif., June 24-27, 1931

Wednesday, June 24

9:30 a.m. General session.
- Report of president, by A. M. Frost.
- Report of treasurer, by N. R. Sutherland.
- Report of secretary, by K. I. Dazey.
- Report of Pacific Coast Electrical Bureau, by W. L. Frost, chairman.
- Report of nominating committee.
- Election of officers.
- Announcements.
- Address by Chester Rowell.

12:15 p.m. Convention photograph in main lobby of hotel.

12:30 p.m. Luncheon in main dining room, with musical program.

2:00 p.m. Parallel sessions of Advertising-Publicity Section, Women's Committee, Commercial Section, Engineering Section, Transportation Section, Purchasing and Stores Section, and Accounting Section.

Entertainment

8:00 a.m. Music by Spanish Fiesta Troubadours.

3:00 p.m. Women's reception and tea in hotel lounge.

8:45 p.m. "Venetian Nights" entertainment at Roman Plunge with spectacular lighting effects.

9:45 p.m. President's reception in hotel lounge.

10:15 p.m. Dancing, with special entertainment.

Thursday, June 25

9:00 a.m. General session.
- Opening remarks by A. M. Frost, president.
- Address by Ernest Greenwood (N.E.L.A.)
- Motion picture, presented by the Transportation Section.
- Presentation of the Advertising-Publicity Section, by R. G. Kenyon.
- Presentation of Accounting Section, by J. C. Forkner.

12:15 p.m. Luncheon in main dining room of hotel, with presentation of the winning speeches in the Western regional division of the national employees' speaking contest.

2:00 p.m. General session.
- Motion picture by the Purchasing and Stores Section.
- Address by Leon O. Witsell, "The Utility of Tomorrow—Self Regulating."
- Talking motion picture, "Dynamic America," presented by the Engineering Section.
- Presentation of playlet by Pacific Coast Electrical Bureau.
- Address by Paul S. Clapp, managing director, N.E.L.A.
- Presentation of playlet by Commercial Section.

Entertainment

8:00 a.m. Music by Spanish Fiesta Troubadours.

2:30 p.m. Bridge tea for women at Pebble Beach Lodge.

8:30 p.m. Fun night. "Home-town Vaudeville" and minstrel show.

10:30 p.m. Dancing.

Friday, June 26

9:00 a.m. Public Relations Section session.
- Introductory talk by E. B. Criddle, chairman, Public Relations Section.
- Presentation of motion picture, "Spanning the Universe" (based on "Round the World" broadcast staged at last year's N.E.L.A. convention in San Francisco).
- Presentation of playlet by the Women's Committee.
- Address by W. C. Mullendore, vice-president, Southern California Edison Company Ltd.
- Presentation by Advertising-Publicity Section, "Something Ought To Be Done About It," an address by William A. Cyr, associate editor, ELECTRICAL WEST, concluded by an air presentation, "Light Workers."
- Presentation of prizes to winners in essay contest.
- Address by J. F. Owens, president, N.E.L.A.

12:00 noon Luncheon in main dining room of hotel.

Entertainment

8:00 a.m. Music by Spanish Fiesta Troubadours.

1:30 p.m. Men's golf tournament.

2:30 p.m. Seventeen Mile Drive for women.

6:30 p.m. Banquet, with special entertainment, followed by ball.

Saturday, June 27

9:30 a.m. General session.
- Closing business of convention.
- Report of committee on the president's report.
- Report of committee on resolutions.
- Introduction of new president, Addison B. Day.
- Presentation of past president's badge to A. M. Frost.

Entertainment

8:00 a.m. Music by Spanish Fiesta Troubadours.

All general sessions will be held in the auditorium at Hotel Del Monte.

A registration booth will be opened on Tuesday night, June 23, and at 8 o'clock on Wednesday, Thursday, and Friday mornings.

Western Winners Chosen In Speaking Contest

Thomas F. Roach, of the Southern Colorado Power Company, Pueblo, Colo., and Mrs. Lillian Broeker, Pacific Gas and Electric Company, San Francisco, won first place in the Western regional finals of the N.E.L.A. National Employees' Speaking Contest, held at Salt Lake City May 15.

Only four contestants won their way in previous elimination contests to compete at Salt Lake City. James Donohue had been judged the victor in Fresno earlier in the month in the northern vs. southern California contest, and took second place to Mr. Roach at Salt Lake City. In competition with Mrs. Broeker was Miss Margaret Mains, of the Public Service Com-

THOMAS F. ROACH

pany of Colorado, Denver, who took second place in the women's contest.

As winners in the Western regional contest, Mr. Roach and Mrs. Broeker each now has a chance of being awarded a first prize of $1,000, second prize of $500, or third prize of $250 in the final

MRS. LILLIAN BROEKER

contest to be held on June 8 during the N.E.L.A. convention in Atlantic City. Their expenses to the convention will be paid by their respective companies as a reward for their achievement thus far.

Mr. Roach, who is an accountant with the Southern Colorado Power Company, was born and educated in Canada. He served with the Canadian forces during the World War and in 1919 was admitted to the bar in Alberta. His public utility experience dates from May, 1923, when he started in the traffic department of the Insull traction interests in Chicago. He came to Colorado in 1925 and joined the Southern Colorado Power Company.

Mrs. Broeker is a member of the personnel department staff of the Pacific Gas and Electric Company. She was formerly employment manager of the San Joaquin Light & Power Corporation, Fresno, having joined that company at Bakersfield, Calif., in 1921.

Northwest Association

Accounting Work Vital To Present Problems

With a good attendance and customary enthusiasm, the seventh annual meeting of the Accounting Section of the Northwest Electric Light and Power Association convened at Salt Lake City April 13-14, 1931, at the call of R. H. Jones, Utah Power & Light Company, chairman. Three half-day sessions were held with a banquet and entertainment on the first night. Headquarters were at the Newhouse Hotel. The committee on arrangements consisted of H. Mann, L. A. Seare, and V. L. Halliday, of the Utah Power & Light Company.

In welcoming the meeting to Salt Lake, George M. Gadsby, president, Utah Power & Light Company, referred to the changing aspect of accounting and urged that accounting departments be prepared to assist the executive departments of the companies as they are called upon to solve changing problems. As an example he cited the desirability of ascertaining the incremental cost of merchandising.

In response for the section, M. J. Wilkinson, Pacific Power & Light Company, stressed the service characteristics of accounting departments and the Accounting Section, stating that accountants were ready to produce any sets of facts that might be desired on account of changing conditions.

A subject outside the routine of committee discussion was introduced at the meeting by Dr. A. S. Bennion, Utah Power & Light Company, in his talk on "Humanity Across the Counter." He classified the difficult people encountered in day-to-day contact with the public in three groups,—chronic complainers, sensitive persons, and people who just do not understand. He placed the responsibility for handling the second and third of these types upon the utility company employees. Three keys to the proper handling of ordinary situations are (1) to understand the urges that actuate human beings, (2) to get all the facts about the case before making the decision, and (3) to cultivate the point of view that the customer must be sent away satisfied.

A summary of the committee discussions follows.

Budget Committee

F. W. BROWNELL

Puget Sound Power & Light Company, Chairman

The report of this committee as presented by H. B. Johnson, Puget Sound Power & Light Company, discussed the creating of a budget consciousness within the company, described methods of preparing the expense budget and the construction budget, and outlined the scope of a register of maturing obligations. Insisting that the budget should not be merely an estimate to be altered at will, the report urged that the responsibility for the administration of the budget be centered in one individual as a budget supervisor or director. Methods of securing strict adherence to the budget by department heads responsible for expenditures were outlined. The value to the financial officer of the register of maturing obligations to permit an economical use of ready cash as portrayed in the last section of the report, which listed the items to be followed up and showed how these items might be conveniently classified.

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Classification of Accounts Committee

R. W. MILLER

Idaho Power Company Chairman

Efforts of this committee in recent years to secure the adoption by the public utility commissions in this territory of the standard classification of accounts and the standard report based upon this classification has been continued during the current year. Comparative studies outlining the differences between the standard report and the reports now required were furnished to the commissions. No definite results were accomplished, but it is thought that the commissions are becoming more receptive to the idea of adopting the standard reports.

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Customers' Records Committee

C. F. KIRCHHAINE

Puget Sound Power & Light Company, Chairman

A simplified form of service contract with residential customers combining also the necessary information for a customer index was recommended in a paper by R. W. Lawlor, Pacific Power & Light Company. This contract, while amply protecting the company, eliminates some of the "red tape" found in most service contracts and thereby tends to promote good-will among customers by saving them time and inconvenience. It further saves time and expense of clerical work for the company. A more elaborate contract was recommended for commercial and industrial customers because of the nature of the demands and service taken by such customers.

In a paper on plans of accounting for merchandise sold on installments, Gus Anderson, Utah Power & Light Company, described systems employed by utility companies using different makes of machines. The paper led to a discussion disclosing the practices of the companies as to billing merchandise charges on separate bills, and as to applying a part payment of cash to the merchandise account or to the service account.

A complete plan of merchandise accounting using the Hollerith system was explained by C. F. Kirchhaine, in which each operation, from the issuing of the purchase order for the merchandise, through its receipt into stock, and on through the sale of the merchandise and the receipt of payment for it, was described in detail. It was pointed out that this plan was the result of a study made to simplify merchandise sales accounting in the storeroom and in the accounting department, and that the plan might undergo some change before being put into practice. This discussion brought out that machine accounting using the Hollerith system should be economical to a utility company having 20,000 or more customers.

The subject of collection and credit methods for merchandise installment accounts was treated in two papers, one by A. R. Weidemann, Puget Sound Power & Light Company, and the other by F. L. Nagel, Northwestern Electric Company. Mr. Weidemann pointed out that credit losses on installment sales increase when we disregard or depart from the well defined principles and the sound recognized rules for credit granting, and came to the conclusion

that proper credit control is as necessary on installment sales as it is on open-account sales. Discussing the usual methods of collecting, he pointed out the fallacy of relying on the collection department to save losses from undesirable accounts and concluded that high bad debt losses were in a large measure due to poor credit control.

Mr. Nagel decried the policy of attempting to solve the credit problem by the universal use of cash deposits and agreed in general with the other paper that an enlightened credit policy is the most effective way of reducing losses. He also outlined effective and economical methods of collection.

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Fixed Capital Records Committee

L. E. HINMAN

Pacific Northwest Public Service Company, Chairman

The value of adequate records of fixed capital in proceedings before regulatory bodies was told in a report by this committee as presented by its chairman, bringing out a number of advantages of such records to the company. Some of the advantages cited were the saving of time, saving in cost over special inventories and appraisals, proof of the actual existence of the property claimed and of the fact that such property is actually used in the public service, and proof of age and condition for depreciation studies. The report concluded that such records engendered confidence in the utility and provided a factual basis for developing claims which will meet the requirements of regulatory bodies and courts as well.

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General Records Committee

B. H. PARKINSON

Northwestern Electric Company, Chairman

The report of this committee, presented by its chairman, consisted of a study of the compilation and payment of the payroll, the distribution of labor cost, and the keeping of personnel records. Four fundamental principles were taken up giving favorable and unfavorable factors or advantages and disadvantages of one method against another, and conclusions were reached in each case as follows: (1) Payment by check was favored as against payment by cash; (2) elimination of field time-keepers and time books and the use of time tickets prepared by employees approved by the foreman was recommended; (3) the extending of time tickets daily and the compiling of payroll and distribution in amount instead of in hours was recommended; and (4) the keeping of distribution of labor costs separate from the payroll was advocated.

Payroll accounting methods for operating payroll, office payroll, and commission payroll were illustrated and described. The use of check writing and check signing machines as against having the checks signed, and the elimination of the protectectograph was advocated, it being shown that an ample measure of protection was secured by the use of the devices suggested. The nature of and necessity for an internal audit was brought out.

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Purchasing and Storeroom Committee

O. W. BENNETT

Puget Sound Power & Light Company, Chairman

In a paper on "Machine Method of Stores Accounting," by I. D. Murfield, Pacific Northwest Public Service Company, the organization necessary to applying machine operation was described and methods were outlined by which control of investment in stores might be exercised by the utilization of substitutes instead of ordering regular standard material, and by the establishment and control of maximum and minimum quantities to be carried.

Salvage methods for securing the greatest value out of materials removed from service were discussed in a paper by Harry Anderson, Mountain States Power Company. Different classes of material were taken up in turn with a suggestion for the best method of either reclaiming the material for use again or of preparing it for its disposal at scrap value. Detail methods of handling returned material were outlined.

In a series of questions and answers relative to various problems of merchandise stores accounting, W. L. Baker, Idaho Power Company, brought out the most economical way to purchase material billed as complete units but composed of several parts, discussed the extent to which the stores department should go in locating discrepancies in stock, suggested that the marking down of returned merchandise should be the function of the local manager in co-operation with the storekeeper, and outlined a plan of accounting for merchandise used in display.

J. S. Ruppe, Utah Power & Light Company, outlined the functions and requirements for proper purchasing, stockkeeping, and accounting, with special reference to the relationship between the purchasing and stores department. He advocated that these departments work in close co-operation to the end that current investment supplies be cut down and that obsolete material be disposed of advantageously.

In the interest of securing uniformity in the manner of storing and keeping stock records, J. M. Laflin, Northwestern Electric Company, advocated the issuance of complete and detailed executive instructions for all the storerooms of the company. He further urged the charging of all minor repair parts direct into operation as soon as these parts are received instead of undertaking the expense of carrying these parts in stores and keeping a record of them from month to month.

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Research Committee

B. GADEHOLT

Northwestern Electric Company, Chairman

Reporting on the work of this committee, the chairman stated that the tax study has been completed and brought up to date. This report, rendered only to executives of member companies, outlined the nature and amount of the taxes assessed in each state, taking into account the new developments in the tax programs.

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Statistics Committee

E. W. MORELAND

Pacific Northwest Public Service Company, Chairman

The chairman reported on the success achieved by the committee in securing the co-operation of the principal municipal power systems in the territory in reporting the statistics of their operations to the National Statistics Committee. Pointing out that the Northwest committee has devoted its attention in recent years to co-operating with the national association, and that there was opportunity to be of service to the companies in the Northwest association through the gathering of statistics for local use, the report recommended that the committee be given the function of gathering and compiling in a uniform manner various statistics used by all Northwest companies and now produced in a non-uniform manner by individual companies.

Meetings

Successful Meeting Held By Utah League

With a good attendance and an interesting program, the tenth annual convention of the Electrical League of Utah was held at the Chamber of Commerce in Salt Lake City April 30.

Following an address of welcome by Harold P. Fabian, president of the Salt Lake City Chamber of Commerce, C. A. Wolfrom, president of the league, opened the morning session, briefly stating that the function of the league would be to continue to build still more satisfactory relationships between its various branches, which in turn would be reflected in a better service to the public by the electrical industry as a whole.

Purposes and methods of the Underwriters' Laboratories were discussed by A. J. Snow, engineer of the Board of Fire Underwriters of the Pacific. Mr. Snow mentioned the advent of electrical codes as the result of former hazardous conditions in electrical wiring and construction work. He stated that today there are 48 representatives in the electrical council to decide whether or not new appliances and materials are to be added to the catalog list.

S. W. Pixton, assistant transportation and protection engineer, Mountain States Telephone and Telegraph Company, next presented a paper on Television, illustrated with lantern slides.

R. P. Maybee, manager, Maybee-Shipley Electric Company, presided at the morning session.

"Selling by Telephone" was the subject covered by Ora H. Barlow, of the sales department of the Mountain States Telephone and Telegraph Company, first speaker at the afternoon session, which was under the chairmanship of W. J. Berryman, manager, electric department, Mine & Smelter Supply Company. Mr. Barlow first called attention to the very high overhead in distribution costs entailed by the traveling representative method of securing sales, and then explained how the telephone could profitably be used in many cases to accomplish results.

Promptness, he said, is one of the attractive features of doing business by telephone, and quoted instances where contracts had been awarded, and electrical people enabled to contact the successful contractor immediately by telephone and secure the electrical business. Mr. Barlow offered the services of his company to any individual or firm to help them solve some of the problems of stimulating business by surveying their particular situation and making suggestions.

S. W. Leaver, treasurer of the Inter-Mountain Electric Company, followed with a discussion of the "Three U's in Business Failure" — uncollected accounts, unsold merchandise, and unprofitable transactions. He suggested that the merchant's money should be put into fast turning merchandise in order to avoid obsolescence, which he characterized as unsold merchandise, or goods not sold when they should be.

W. O. Smith, sales manager, General Electric Supply Corporation, discussed the subject of "Merchandising." In urging electrical contractors to "sell" a job rather than to "buy" it, Mr. Smith quoted several instances in his experience where the success of contractors had been definitely traced to the fact that they had encouraged the prospective customer to place in his home what he really wanted for lifetime service and comfort, rather than to try and cheapen the job and underbid a competitor.

H. M. Ferguson, assistant to the vice-president, Utah Power & Light Company, was the last speaker, his subject being "Complete Electrification of the Home." He declared that there really are no lines dividing the various branches of the electrical industry, and that the real job to be done by all of its members is to promote the greater use of electricity. The free flow of electric energy, he said, is really the

foundation of the entire industry, and the home the most alluring field for its development.

In briefly tracing the progress of the industry, Mr. Ferguson spoke of the skeptical attitude of people toward Mr. Edison's first lamp. The same skepticism prevailed toward many later developments which were afterward proved successful and feasible. Even the feasibility of electric cooking, he said, was questioned not so very many years ago, and electric refrigeration was formerly deemed a remote possibility—something that might be developed in the far distant future—yet last year three-quarters of a million electric refrigerators were sold in the United States. Water heating, he declared, is just one more step in this march of progress.

In speaking of kilowatt-hour consumption in the home, Mr. Ferguson compared the former slogan of "one kilowatt-hour per day, or 365 kilowatt-hours per year," with the present situation where the Utah Power & Light Company, for instance, has residential consumers on its lines who are using 500 kw.-hr. per month. "We have at this time, in Salt Lake Valley," he stated, "four electric ranges to every arc lamp."

Mr. Ferguson stressed the importance of these figures in terms of stimulation for other allied business, for other persons who are interested in selling jobs, etc.

The speaker further stated that the electrical idea and electrical appliances should be sold on their merits. He suggested that if the salesman wants to do a good job of selling complete electric service in the home he should list the various services, with their costs as compared with old-fashioned methods.

It was decided not to hold the banquet originally scheduled to follow the meeting in the evening.

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Activities of P.C.E.B. Set Forth at Meeting

Despite the opening of the fishing season, a crowd of 250 people in the electrical industry in southern California met at the Chamber of Commerce Building, Los Angeles, on the evening of May 1, to hear of the reorganized Pacific Coast Electrical Bureau. W. L. Frost, vice-president in charge of commercial activities, Southern California Edison Company Ltd., and chairman of the board of directors of the bureau, presided.

Speakers and the subjects covered, representing all of the phases of activity of the bureau, included the following: R. E. Fisher, vice-president in charge of public relations and sales, Pacific Gas and Electric Company, San Francisco, who described the statewide advertising work and publicity activities of the bureau designed to popularize greater use of electricity. He also described the particular promotional activities planned by the lighting committees of the bureau, of which he is director.

R. M. Alvord, manager, General Electric Company, San Francisco, who set forth the interrelation of the various activities of the bureau from the intimate knowledge of its organization which he only, as its creator, could have.

A. E. Hitchner, Los Angeles manager, Westinghouse Electric & Manufacturing Company, and director of the state industrial electrification committee, who outlined the modernization and industrial electrification plans sponsored by his committee.

K. I. Dazey, managing director of both the Pacific Coast Electrical Bureau and Pacific Coast Electrical Association, who set forth the interrelation and the differences existing between those organizations.

Victor Hartley, assistant managing director, P.C.E.B. and P.C.E.A., who reported for Director D. E. Harris, vice-president, General Electric Supply Corporation, San Francisco, state chairman of the Red Seal committee.

A. M. Frost, manager agricultural power sales, Pacific Gas and Electric Company, and chairman of the state agricultural electrification committee, who outlined the uses to which his committee planned to put the fact data already gathered, as well as those compiled by the Committee on the Relation of Electricity to Agriculture and the P.C.E.A. agricultural power committee.

E. G. Stahl, commercial manager, San Joaquin Light & Power Corporation, chairman of the Commercial Section, P.C.E.A., who described the importance of the bureau's work in connection with the fact-finding work of the committees of the association.

H. L. Harper, manager, Graybar Electric Company, Los Angeles, state chairman of the P.C.E.B. appliance merchandising committee, who described the intentions of his committee for the further promotion of appliance merchandising.

R. G. Kenyon, assistant advertising manager, Southern California Edison Company Ltd., and southern California director in charge of the national refrigeration campaign, who outlined briefly the co-operative set-up for the sale of southern California's share of the million refrigerator national quota set for this year.

G. E. Arbogast, president, Newbery Electric Corporation, Los Angeles, and president of the California Electragists, who introduced:

Frank Connolly, executive secretary, California Electragists, Southern Division. Mr. Connolly reported on the convention just held that day by the Electragists and pledged the support of all Electragists in southern California to aid in full and hearty co-operation with the program of the bureau. His final plea was, "Give us a program. Let us know what it is and we will go!"

W. L. Frost closed the meeting with a review of recent rate reductions which favor the further sale of electrical energy in the region.

Coming Events

American Institute of Electrical Engineers—Annual Pacific Coast Convention, Lake Tahoe, Calif., Aug. 25-28, 1931.

International Association of Electrical Inspectors, Northwest Section—Sixth annual convention at Salem, Ore., Oct. 5-7, 1931.

Southwestern Section—Convention in San Francisco, Sept. 28-30, 1931.

National Electric Light Association—Fifty-fourth convention and exhibition, Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12, 1931.

Rocky Mountain Division—Annual convention at Stanley Hotel, Estes Park, Colo., Sept. 2-4, 1931.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., Oct. 8-10, 1931.

Pacific Coast Electrical Association—Annual convention at Hotel Del Monte, Del Monte, Calif., June 24-26, 1931.

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Portland Electric Club Elects Officers

The Portland Electric Club at its regular meeting, May 11, elected the following officers for the coming year: President, H. W. Brown, Electric Corporation; vice-president, E. G. Hall, General Electric Company; secretary-treasurer, M. S. Glenn, Northwestern Electric Company; sergeant-at-arms, J. M. Cavanaugh, manufacturers' agent.

In addition to the above, the following members of the executive board were elected: L. W. Going, chief electrical inspector; Berkeley Snow, ELECTRICAL WEST; F. H. Murphy, Portland General Electric Company; W. J. Cottrell, manufacturers' agent. The retiring president, R. C. Kenney, NePage McKenny Company, automatically assumes a place on the board.

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Westinghouse Company Elects Officials

At the organization meeting of the board of directors of the Westinghouse Electric & Manufacturing Company, held in New York, April 29, the following were elected: A. W. Robertson, chairman of the board; F. A. Merrick, president; J. S. Tritle, vice-president in charge of manufacturing; S. M. Kintner, vice-president in charge of engineering; and W. S. Rugg, vice-president in charge of sales.

L. A. Osborne, H. P. Davis, H. D. Shute, James C. Bennett, H. T. Herr, Walter Cary, T. P. Gaylord, and Harold Smith, were re-elected vice-presidents. C. A. Terry was elected honorary vice-president, and E. M. Herr was re-elected vice-chairman.

Two Eminent Speakers On Jobbers' Program

K. I. Dazey, managing director, Pacific Coast Electrical Bureau, and Dr. N. A. Bowers, vice-president and general manager, McGraw-Hill Company of California, addressed the open meeting on the last day of the National Electrical Wholesalers Association Pacific Division convention held at Hotel Del Monte, Del Monte, Calif., May 7-9. As usual, closed sessions occupied the first two days of the meeting.

Mr. Dazey gave a comprehensive review of the manner in which the Pacific Coast Electrical Bureau functions, explained how it could be useful to the wholesalers, and outlined the help that the bureau needs from them. Dr. Bowers discussed "Business and the Alibi of 'Average.'"

Winners of trophies in the usual handicap golf tournament were H. W. Allen, Graham Reynolds Electric Company, Los Angeles, Copper Cup; S. B. Gregory, Arrow Electric Company, San Francisco, Roscoe Oakes Cup; Harry Byrne, North Coast Electric Company, Seattle, Turner Trophy; and George Bailey, Westinghouse Electric & Manufacturing Company, San Francisco, Manufacturers' Cup. This being the third time that the Turner Trophy has been carried off by Mr. Byrne, that cup now becomes his permanent possession. The Central Station Cup was not played for at this meeting.

The association will hold its next meeting at Del Monte Oct. 8-10, 1931.

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Radio Interference Assn. Meets in San Francisco

Representatives from cities throughout California attended a third session of the California Radio Interference Association held at the Bellevue Hotel, San Francisco, April 27-29. The following papers were presented:

"Control of Interference," by A. W. Copley, Westinghouse Electric & Manufacturing Company; "Design of Insulation to Eliminate Radio Interference," by Ralph S. Jenner, Lapp Insulator Corporation; "The Problem of Field Strength and Noise Level," by G. R. Walters, Radio and Music Trades Association of Southern California; "Filtering Every Service," by W. M. Jacobs, City of Sacramento; "Antenna and Ground Systems," by Paul E. Current, Pacific Radio Trade Association.

On Monday, April 27, the association was honored at the luncheon meeting of the San Francisco Electrical Development League. George R. Walters, president of the association, gave an interesting outline of the activities of his organization. A demonstration of the cause and method of eliminating interference was given by N. E. Borch, radio engineer of the California Electrical Construction Company, and Fred D. Rowe, radio interference investigator of the Pacific Radio Trade Association. Musical entertainment was furnished by Station KFWI. In the evening the group motored to the United States Radio Monitoring Station in Marin County as guests of Bernard Linden, radio supervisor, who explained the method of checking broadcasting stations.

On Tuesday evening, April 28, guests were honored at an open meeting at the Bellevue Hotel, at which Mr. Walters outlined the accomplishments of the session. Station KJBS and Frank Bevan and F. S. ("Pat") Curren of the sales department of the Pacific Gas and Electric Company, furnished entertainment and Mr. Borch and Mr. Rowe again gave their interference demonstration.

On Wednesday morning, April 29, the group visited the Emeryville factory of the Westinghouse Electric & Manufacturing Company.

One of the most important subjects considered during the session was the installation of receivers. It developed that the matter of installation has not been receiving proper attention from the dealer, and as a result approximately one-third of the complaints are traceable to that cause. As a result, the group adopted a resolution endorsing the procedures for installing antenna and ground systems outlined in a booklet, "Radio Interference."

George R. Walters, president, and George H. Curtis, secretary, were re-elected, and the next meeting of the association was set for Oct 27-28, in Los Angeles.

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Los Angeles Electric Club Holds Successful Golf Tournament

CONCEDED by those taking part to be the most successful the organization has ever had, the second annual golf tournament of the Los Angeles Electric Club was held at the Oakmont Country Club on April 20, with entries totaling 176. Luncheon was served to 50 members and guests, who later formed a gallery at the first tee.

Results were as follows: "A" flight—handicap 0-18, inclusive: Low gross, Glenn E. Arbogast, Newbery Electric Corporation, 81; low net, L. E. Darrow, Graybar Electric Company, 70; and blind bogey, C. P. Soderberg, Westinghouse Electric Supply Company; "B" flight—handicap 19-24, inclusive: Low gross, George Armstrong, Garland-Affolter Engineering Company, 89; low net, A. E. Hitchner, manager, Westinghouse Electric & Manufacturing Company, 67; and blind bogey, Jefferson Davis, Southern California Edison Company Ltd.; "C" flight—handicap 25-34, inclusive: Low gross, Paul Ehm, Golden State Electric Company, 95; low net, Tom B. Parks, Los Angeles Gas and Electric Corporation, 69; H. V. Harris, Southern California Telephone Company, 69; and blind bogey, F. H. Mayer, Southern California Edison Company Ltd.; "D" flight—guests only, all handicaps: Low gross, J. E. Bissett, Listenwalter & Gough, 85; F. A. Phillips, Southern California Edison Company Ltd., 85; low net, Will Cranston, Hoffman Specialty Company, 66; and blind bogey, R. H. Harding, Southern California Telephone Company.

Trophy winners and others on the Oakmont Country Club links during the Los Angeles Electric Club's golf tournament in April. Left to right: LeRoy Williams, Pacific Electric Manufacturing Company; Frank Watkins, purchasing agent for the Edison Company (president of the club); Warren W. La Barr, American Brown Boveri Company; N. B. Hinson, Edison Company; R. E. Northmore, Los Angeles Gas and Electric Corporation; G. M. Wills, Southern Sierras Power Company; George Armstrong, Garland-Affolter Engineering Company (low gross, flight "B"); Fred Lewis, vice-president, Edison Company; John Morris, assistant manager, Westinghouse company; Joe Framton, superintendent shop test department, Edison Company; and A. E. Hitchner, Los Angeles manager, Westinghouse company (low net, flight "B")

Personals

M. C. Smith Succeeds F. J. Gannon at El Paso

FOLLOWING the recent transfer of Francis J. Gannon to Tampa, Fla., to assume the duties of vice-president and manager of the Tampa Electric Company and its subsidiaries, M. C. Smith was named manager of the El Paso Electric Company, El Paso, Texas, to succeed Mr. Gannon.

For the past five years Mr. Smith has been president of the Baton Rouge (La.) Electric Company and was also president of the Louisiana Steam Products Company. Under his management, the latter company recently completed a 45,000-kw. power plant at Baton Rouge which embraces many features of construction that are unique in power station practice. During the five-year period under Mr. Smith's management the Baton Rouge property made notable progress and was considerably expanded in size.

A native of Maine, Mr. Smith spent the early years of his business life with the Cape Breton Electric Company, Ltd., at Sydney, Nova Scotia. Beginning as a student engineer, he worked his way up through many departments of the company until in 1923 he was made manager. His service with the company during this period had been interrupted by his assignment first to the Brockton and Plymouth (Mass.) Street Railway Company as manager, and later to the Nova Scotia Tramways and Power Company where he had supervision of the tramway department. He left the Cape Breton company in 1926 to take up his duties as manager of the Baton Rouge Electric Company.

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REX A. BACKUS, formerly sales manager of the Hawaiian Electric Company, Honolulu, T. H., resigned on April 1 to open an electric merchandise department for the Von Hamm Young Company, Ltd., which has carried on a large wholesale distributing business in the Islands for the past 35 years. J. F. Fenwick, assistant general manager of the Hawaiian Electric Company, has announced that R. H. Slocum has succeeded Mr. Backus as sales manager of that company. Mr. Slocum has been associated with the power company in its commercial department for some time.

A. EMORY WISHON, vice-president and assistant general manager, Pacific Gas and Electric Company, San Francisco, has been appointed chairman of a committee of the California Chamber of Commerce whose object is the removal of 50,000 advertising signs from California highways.

M. C. SMITH

CLARK BAKER, SR.

R. H. BALLARD

Clark Baker Leaves National Lamp Works

CLARK BAKER, SR., for 21 years with the National Lamp Works of the General Electric Company, Oakland, Calif., will leave the employ of the General Electric Company on June 1. This step becomes necessary because of the abandonment of the promotional and educational work of the National Lamp Works in this territory, for which Mr. Baker has become nationally famous. The news will be received with regret by the Western electrical industry because of Mr. Baker's outstanding work on behalf of lighting.

Mr. Baker brought to the lighting profession a showmanship derived from his youthful experience on the stage and in circus work. This showmanship he has always transplanted into lighting with the effect that, together with a genuine creative imagination, he has initiated movements in lighting practice always several years ahead of the trade. Thus as a pioneer in lighting development he has been responsible for many movements which today are bringing and will continue to bring ample returns to the industry.

In contacts with the architectural profession, with schools, women's organizations, and clubs he has often carried a dramatic, inspiring lighting message where others could not gain audience. Recognition for the educational and promotional work he did was given him by the General Electric Company in 1929 when the Charles A. Coffin Medal for signal contributions by employees of that company, was awarded to him. (See ELECTRICAL WEST, May 1, 1929, p. 309.)

Clark Baker is determined to continue in lighting work, which has become his life, and will be active in the lighting features of the P.C.E.A. convention, the Illuminating Engineering Society's architectural lighting institute this fall, which he has inaugurated and planned, and activities of the industry in general. He intends to make a vacation trip after the convention to some of the Western national parks, after which he will be available for new connections.

State Chamber Elects R. H. Ballard Director

AT A RECENT meeting of the California State Chamber of Commerce R. H. Ballard, president of the Southern California Edison Company Ltd., Los Angeles, was elected to the board of directors of that body.

Mr. Ballard, whose work in the electrical industry has been nationally recognized, began his business career as office boy with the Thomson-Houston Electric Company, of Chicago, predecessor of the General Electric Company, in 1890, remaining in its employ until 1897. He came to California 34 years ago and was engaged as auditor by the Westside Lighting Company, to which the present Southern California Edison Company traces its source.

With the exception of a short interval when he served the Butte Electric Company in Montana, Mr. Ballard's service with the Edison company has been uninterrupted. Since 1920 he has held the position of general manager and since 1924 has served as executive vice-president and general manager. He is a past president both of the Pacific Coast Electrical Association and the National Electric Light Association.

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GEORGE CARROTHERS, formerly complaint clerk in the Santa Cruz (Calif.) office of the Coast Counties Gas & Electric Company, has been appointed district manager of the company's Hollister office. He succeeds Myles W. Gahan, who resigned May 1. Mr. Carrothers has been with the Coast Counties company for five years, during which time he has been repeatedly advanced in various departments. His present promotion comes as a reward for his efficiency and thorough knowledge of his work.

P. J. KENNEDY, special agent, Los Angeles Gas and Electric Corporation, following more than 24 years' service with that corporation, has been added to the membership of its Honor Roll.

W. CHESTER MORSE

CLAUDE H. WEBBER

Successor to J. D. Ross Of Seattle Agreed On

W. CHESTER MORSE, consulting engineer, who served as city engineer of Seattle during 1927 and 1928, has been named to succeed J. D. Ross as superintendent of Seattle's Lighting Department. The appointment was made by Mayor Frank Edwards and was the second in a succession of five appointees named by the mayor and tentatively rejected by the City Council during a protracted struggle to bring about the re-instatement of Mr. Ross. Mr. Morse was confirmed by a five-to-four vote of the council.

Mr. Morse has been a resident of Seattle since 1882. In 1908 he started in private engineering practice in Seattle, and since that time he has planned and supervised the construction of numerous water systems. For two years he was chief engineer of the Puget Sound Bridge and Dredging Company in charge of hydraulic projects. In 1916 he enlisted in the National Guard, Coast Artillery Reserve. In the World War he served for nineteen months in the 50th Heavy Artillery and was discharged with the rank of major. A member of the American Society of Civil Engineers, Mr. Morse has been engaged in private practice since his retirement as city engineer of Seattle.

Commenting on his appointment as head of the City Lighting Department, Mr. Morse said: "I am a firm believer in municipal ownership of public utilities, at least so far as power and light are concerned, and it will be my endeavor to make the City Light Department pay dividends to the people of Seattle. The only way this can be done is by reducing rates. I am not saying I can do this right away, for 1932 will see the peak drain on the department bond redemption and interest payments."

Mr. Morse opposed the charter amendment, carried at the spring eleciton, giving the City Light Department its own engineering staff, stating that Seattle has not grown large enough to make the move necessary.

Arizona Utilities Head Has Successful Gas Record

CLAUDE H. WEBBER, since 1922 superintendent of gas operation and construction for the Tucson Gas, Electric Light and Power Company, Tucson, Ariz., is the newly elected president of the Arizona Utilities Association. He was chosen for the post at the annual convention of the organization held in Phoenix April 8-11.

A native of Minnesota, Mr. Webber moved with his family to California in 1900. He began his public utility career by operating a small gas plant in that state from 1912 to 1920. Then he became superintendent of gas operation for the City of Redlands, Calif., a position he held until 1922, when he went to Tucson to take charge of gas operation and construction for the Tucson Gas, Electric Light and Power Company. Since 1922 the gas deliveries and sales for the Tucson company have increased 50 per cent, and this increase is accredited largely to Mr. Webber's activities.

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WILLIAM P. ("TEDDY") BEAR, in charge of lighting sales for the Pacific Gas and Electric Company, San Francisco, returned last month from an extensive and intensive visit to the lighting institutes of various manufacturers in the East. He visited the Chicago, Nela Park, Cleveland, Washington, New York, Harrison, and Schenectady research laboratories and institutes. Upon his return, Mr. Bear addressed the Bay Cities chapter of the Illuminating Engineering Society on his observations of recent lighting developments and trends in modern factories.

NATHAN KAUFMAN, foreman of the substation maintenance crew, El Paso Electric Company, El Paso, Texas, has been presented with the Samuel Insull Medal for saving the life of Jack Burkholder, a fellow workman, using the Schaefer prone pressure method of resuscitation. Mr. Kaufman also received a certificate, signed by the president of the N.E.L.A., and a gift of $100 in gold from the El Paso company.

Obituary

George E. Roe of San Francisco Passes

GEORGE E. ROE, pioneer electrical contractor of San Francisco, secretary and manager of the Enterprise Electric Works, died of a heart affliction after several months of illness on April 30. Mr. Roe was widely known throughout California and although never having accepted any office in association work, was always affiliated with contractor association activities. He organized the Enterprise Electric Works in 1910 and had been manager since that time.

GEORGE E. ROE

He is succeeded by Frank R. Cole, assistant manager under him and now made manager of the company.

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AUGUSTUS D. CURTIS, president and founder of Curtis Lighting Inc., Chicago, died suddenly April 29 at Beverly Hills, Calif., at the age of 65. His passing culminates a life devoted to the art and science of illumination, his major contribution being the introduction of indirect lighting and the foundation of a company dedicated to advancement of lighting for the aid and protection of human eyes. The National X-Ray Reflector Company, forerunner of Curtis Lighting, Inc., was founded by Mr. Curtis in 1897.

WALTER ALFRED MOSER, for more than ten years manager of the Salt Lake City office of the Westinghouse Electric & Manufacturing Company, died in that city May 22 at the age of 45 after an illness of about seven weeks. He had been affiliated with the Westinghouse company since June, 1907. A native of Union Hill, N. J., Mr. Moser spent most of his youth in Lincoln, Neb., and was graduated from the School of Engineering of the University of Nebraska.

ROBERT T. REID, general manager of the Instantaneous Alarm Company, Seattle, died in that city on May 6, at the age of 69 years. Mr. Reid was an active member of the Electric Club in Seattle.

Contractor Dealer Inspector

Southern Electragists Review Situation

Placing both feet firmly upon the solid ground of reality, the California Electragists, Southern Chapter, braced themselves at their spring convention with factual reports of conditions in the various lines of activity interesting to their members, and set themselves to face the many-problemed future of the electrical contractor-dealer business during the next year. The convention was held at the Alexandria Hotel, Los Angeles, on the morning and afternoon of May 1. During most of the sessions C. A. Rowley, vice-president of the Southern Chapter, presided in the place of Glenn Arbogast, president, who was representing the association at various other industry meetings.

Long Beach's electrical merchandising experiment, wherein the Southern California-Edison Company Ltd. six months ago turned over to dealers the entire responsibility for placing range, water heating, and refrigerator load on its lines on a fifteen-month trial, occupied the first place on the convention program. L. O. Wetzel, chairman of the Long Beach dealers, reported on the progress of the plan to date. Despite slow organization, a decline of 75 per cent in gas range sales by hardware and department stores, 42 per cent decline in electrical permits, 42 per cent decline in electric range sales in all southern California, substantial decline in the volume of most local businesses, and the competition of municipally owned low rate natural gas in the city of Long Beach, the dealers had been able to sell 50 ranges retail and 50 ranges had been sold wholesale to apartment houses, making a total of 100 ranges for the period. "Under normal business conditions in a good year, the power company, with years of experience behind it, would probably have sold about 150 ranges during this period," the report stated.

Under the circumstances the situation was considered favorable. The following lessons were listed as having been learned by the mistakes made:

(1) Newspaper advertising alone will not sell ranges. (2) Selling ranges requires specialty salesmen properly trained. (3) Lack of co-ordinated sales activity under a sales manager causes confusion of effort. Systematic co-operating supervision will produce better results. (4) Present margins on ranges are considered insufficient to carry the expense of promotional work required.

In discussion led by P. R. Mactolf, Glendale Electragist and former president of the Estimators' Section, experiences and labor cost data on the installation of thin wall conduit or electrical metallic tubing were exchanged. Labor savings of from 16 to 23 per cent on various classes of work were reported and the advantages and disadvantages of the materials discussed in detail. The majority opinion was that the product would either find acceptance or be rejected on its merits, a matter of experience and practice.

Ralph E. Homann, president of the Builders' Exchange of Los Angeles, in a pleasant and constructively encouraging manner, surveyed all of the factors attending the present business depression and particularly the falling off of building of all kinds. Mr. Homann declared frankly that no immediate improvement was in sight for any general boom of conditions. He urged that business men write off past values and re-establish themselves on a basis as of today.

A uniform suggested resale price book for pricing time and material work, prepared by A. H. Gudie, secretary of the Association of Electrical Contractors of Los Angeles, was offered to members of the Southern Chapter at the cost of preparation.

After a noon luncheon, the meeting was re-assembled and L. H. Ellett, engineering salesman of the Quality Electric Works, Los Angeles, and president of the Estimators' Section, presented a paper on the best methods of selling a contractor's services to industries that have been doing their own electrical work. This paper will later be reprinted in full in ELECTRICAL WEST.

J. O. Case, president of the Quality Electric Works, and prominent in the Motor Section of southern California, spoke on "New Business From Electrical Modernization." He spoke of the plans made for promotion of modernization and industrial electrification by the modernization committee of the Pacific Coast Electrical Bureau. He also announced that a new and improved motor franchise had been offered dealers by one large manufacturer and that possibly others would follow this example shortly. Mr. Case ended by stating emphatically that none of these activities would be automatic business builders; that electrical contractors must study up and "know their stuff" and sell their services if they wanted to realize on this work.

Taking a cue from these remarks, W. A. Cyr, associate editor, ELECTRICAL WEST, showed that in an industry only 50 or more years old and on the threshold of some of its most revolutionary developments, there should be no room for doubt as to the future of such a business, provided the contractor kept himself wide awake to new developments and ideas and conducted his business properly. The speaker described briefly some of the significant trends in electric heating practice, ventilation and air conditioning, radio installation and interference elimination, industrial uses of photo-electric and electronic cells, fuseless switching, and the remarkable possibilities of lighting as a decorative medium.

Standardizing the installation cost of wiring at $40 for electric ranges where the minimum requirements are as recommended and approved by the California inspectors, was perhaps one of the most significant actions taken by the convention. Where a job exceeds the minimum in specification requirement or code rules in a locality having an all-metal ordinance, corresponding adjustments are included in the plan.

Executive Secretary F. J. Connolly swiftly reviewed the progress of the association during the past six months and announced the program for the next year. The most significant pending work of the association relates to the local enforcement of the fair trade practice rules for the contracting industry now before the Federal Trade Commission for approval. A review of the reorganization of the Motor Section of Southern California was described and membership and finance matters were discussed. The program for the six months to come was declared to contain the following purposes:

1. Complete the organization of the electrical division of the Los Angeles Credit Men's Association.
2. Continue efforts to establish fair sales policies by jobbers and manufacturers.
3. Build up a code of ethics for

Will Transfer To Northwest

LEE C. BALTZELLE, for the past year sales engineer for Norton & Norton, industrial electrical contractors, Los Angeles, has been appointed engineer for Swett & Crawford, insurance brokers in San Francisco, and the Pacific Indemnity Company of Los Angeles, in charge of inspection of industrial plants in the Northwest, with headquarters in Portland. Prior to his affiliation with Norton & Norton, Mr. Baltzelle was sound engineer for Fox Studios for two years, and sales engineer with the J. J. Farley Electric Company, Fullerton, Calif., for nine years. He has been a very active worker with the California Electragists.

LEE C. BALTZELLE

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members and re-establish the contractor-dealer in his proper place in the industry.

President Glenn Arbogast closed the meeting in a fitting manner by appealing to members to maintain the association at all costs during the very trying days ahead, which he described as the most serious that the electrical industry has faced in many years, as an insurance against a breakdown of the progress which has been bought at the expense of so great pains and effort during the past few years.

The meeting adjourned so that the assembly under the direction of H. H. Walker, former president, might visit the new Edison Building in Los Angeles, whose wiring installation was installed by Mr. Walker. Following a thorough trip throughout the building under the guidance of H. P. Crane, of the engineering design department, the entire group attended the industry dinner of the Pacific Coast Electrical Bureau, reported elsewhere in this issue.

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Northern Chapter Holds One-Day Convention

Too late to report in this issue, the Northern Chapter, California Electragists, held its annual meeting at the Athens Athletic Club, Oakland, Calif., on the afternoon and evening of May 21. Walter Vance, Pacific Electric Motor Company, Oakland, chairman of the Northern Chapter, presided.

The program was designed to cover the various phases of contractor-dealer activity affecting members and nonmembers in the northern California region. The proposed Federal Trade Commission approved fair trade practice rules for the contracting industry were to constitute the major feature of the program. Discussion as to the machinery to set the rules in motion was to take up the main part of the discussion on the evening program. Business building possibilities in various lines of endeavor, progress in improving trade relations with both wholesalers and central stations, developments under the co-operative merchandising plan of the central stations, the business significance of the re-organized Pacific Coast Electrical Bureau set-up, and membership and organization problems were to receive attention, according to the preliminary program.

Full details will be reported next month.

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BEN JOHNSON, who for many years has conducted his business, the Tamalpais Electric Company, in a store under his home on the main highway near Kentfield, Calif., recently announced the opening of a new store in San Anselmo, where appliances and fixtures will be more extensively shown. Mr. Johnson has been for the past three years the president of the "Marvelous Marin Electrical Development League," one of the oldest electrical leagues in the state.

Starts Radio Engineering

TO MEET the immediate demand for better radio installations the California Electrical Construction Company, San Francisco, has inaugurated a radio engineering department with N. Earl Borch, formerly chief radio interference engineer for the Pacific Radio Trade Association, in charge. This department, whose activities will extend to all of northern and central California, will have the sole distribution for the Multicoupler aerial system for that territory. Gold Seal standards of installation will be in use throughout, and each job will carry a definite guaranty both as to performance and durability.

Other activities of the department will include installation of public address systems, centralized radio systems, remotely controlled radio receivers, filters on any electrical appliance causing radio interference, hotel radio and paging systems, and maintenance of elaborate radio or audio systems. In addition, a regular radio engineering consulting service will be established covering the territory named. This is to include surveys for the elimination of radio interference from all possible sources.

Clyde L. Chamblin is president of the California Electrical Construction Company. Mr. Chamblin is a past president of the Association of Electragists-International, a former president of the California Electragists, and has served as a director of the Pacific Radio Trade Association.

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THE BEAUMONT ELECTRIC, retail electric store, has opened in Vancouver, B. C. Besides an extensive merchandising business, the firm will do a contracting business in its neighborhood.

DALTON & POST have opened an electrical contracting shop at 1528 Whittier Blvd., Whittier, Calif., and will specialize in oil field installations. Both members of the partnership are well known in the electrical field. Mr. Dalton has served as chief electrician with the H. C. Smith Manufacturing Company, the Globe Oil Tool Company and Crum & Brainard Company.

SERVICE ELECTRIC WORKS, formerly situated on Randolph St., in Huntington Park, Calif., now is operating from its new plant at 2785 East Slauson Blvd. in that city. J. Hamn is the owner of the shop, which is fully equipped to handle industrial lighting and motor installations and specializes in industrial plant maintenance.

J. DELANEY and H. Farmer recently bought out the Herrod Electric Company at San Anselmo, Calif., and have renamed it the San Anselmo Electric Company. Mr. Delaney specializes in the servicing and selling end and Mr. Farmer runs the wiring end of the business.

Mountain Inspectors Form I.A.E.I. Chapter

A new chapter of the International Association of Electrical Inspectors, comprising Colorado, Wyoming and New Mexico, was formed at a convention of inspectors held recently in Denver.

Officers elected are: L. A. Barley, chief engineer, Mountain States Inspection Bureau, chairman; E. A. Burt, city electrical inspector, Colorado Springs, Colo., first vice-chairman; F. H. Beatty, fire chief and electrical inspector at Clayton, N. M., second vice-chairman; V. C. Moulton, electrical inspector of Mountain States Inspection Bureau, secretary-treasurer.

The uniform electric wiring ordinance recommended by the Mountain States Inspection Bureau for adoption by municipalities in Colorado, Wyoming and New Mexico, was discussed at length by convention delegates and, finally, endorsed.

Speakers at the all-day meeting which resulted in the organization, were: W. S. Boyd, secretary, Western Section, I.A.E.I., Chicago, whose topic was "Provincialism"; A. E. Burt, who spoke on "Enforcement Problems"; G. E. Bowermaster, National Electrical Products Corporation, Pittsburgh, who told of "Insulated Wire Standards"; L. A. Vosmer, Electragist, Denver, who detailed "Comparative Wiring Costs"; H. M. Mack, assistant manager, Mountain States Inspection Bureau, Denver, who talked of "Model Forms for Applications, Permits and Certificates"; L. A. Barley, who described the model wiring ordinance, and others who attended, who spoke on the special subjects discussed under the topic of "Inspectors' Problems."

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THE ADVANCE ELECTRIC COMPANY, R. L. Pew, proprietor, has recently moved to a new shop at 909 Eighteenth St., Bakersfield, Calif.

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Tahoe Like Homeland

Ben Johnson, "Marvelous Marin Electrical Development League" president, and his daughter enjoy winter sports at Lake Tahoe, Calif.

Manufacturer Distributor

Copeland Representatives Convene in Los Angeles

Over two hundred Copeland refrigerator representatives convened at the Los Angeles Elks' Club May 14-15 for the purpose of hearing W. D. McElhinny, vice-president of Copeland Products, Inc., Mt. Clemens, Mich, in charge of sales, and to discuss future merchandising methods and plans. A high note of optimism prevailed throughout the two-day meeting and new sales records this year in this territory were predicted.

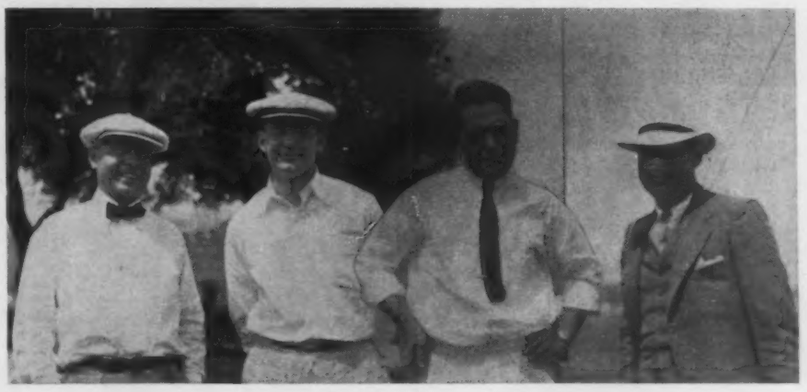
Mr. McElhinny gave intimate talks on national and local conditions pertaining to the refrigeration industry. It was revealed that electric refrigeration was one of the few industries to show a gain in 1930 over 1929. The Copeland company has showed a gain of more than 50 per cent this year over the business of the preceding year, a mark far in advance of the industry in general. Howard F. McKay, executive of Foster & Kleiser, also spoke on

W. D. McElhinny (left), vice-president in charge of sales of the Copeland company, is welcomed to Los Angeles by Evan O. Thomas, president of the Thor Pacific Company, Copeland refrigerator distributor

the program and offered many interesting highlights on the bearing of advertising on prosperity. Daily newspapers were also represented.

Evan O. Thomas, president of the Thor Pacific Company, distributors for Copeland refrigerators and Thor washers and ironers, was the official host of the convention, and was likewise one of the speakers. L. R. Swenson, of the same concern, presided as toastmaster. Dealers agreed that McElhinny's talks were the most illuminating yet heard in this section on the subject of electrical refrigeration.

Representatives Are Also Golfers



The second annual golf tournament of the Los Angeles Electric Club, on April 20, proved to be a veritable southern California round-up of electrical manufacturers' representatives. Above, caught by the camera just after the tournament, are (left to right) Warren W. LaBarr, Pacific Coast district manager, American Brown Boveri Company, Inc., and Condit Electric Manufacturing Company; L. H. Hill, manager transformer division, American Brown Boveri Company, of Camden, N. J.; C. D. LaMoree, manufacturers' agent of Los Angeles; and Emmett H. Jones of the Industrial Engineering & Equipment Corporation, Los Angeles

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THE WASHINGTON IRON WORKS, 1500 Sixth Ave. South, Seattle, has secured a contract for furnishing a 325-hp. Diesel generating set and switchboard for a power plant to supply lighting service to Yakima Park, Rainier National Reserve, Wash. The award was made by the National Park Service. The plant will cost between $50,000 and $60,000.

RAILWAY AND INDUSTRIAL ENGINEERING COMPANY, Greensburg, Pa., has appointed Charles Croft factory representative in the southern California territory. Mr. Croft will operate through the Utilities Equipment Corporation, Ltd., 110 North Alameda St., Los Angeles, selling agent for the Railway and Industrial Engineering Company's generating and substation switching and protective equipment.

SQUARE D CREATES POWER FILTER DIVISION—L. W. Mercer, vice-president and general manager, Square D Company, Detroit, has announced the establishment of a Power Filter Division of the Square D Company, with offices and works at Detroit. M. D. Williamson will be in charge of the new division, which will manufacture power filter units for the conversion of direct current from alternating current for telephone, public address systems, talking picture equipment, and other sound and signal apparatus.

ECKART BROTHERS, Seattle, have been appointed Northwest representatives for Copeland electric refrigerators, with C. W. Dawson, for four years associated with the Copeland interests, as sales manager. A display room, storage quarters, and service department will be maintained at 419 Eighth Ave. North.

Mauldin Forms Company To Operate in California

Formation of the Dodd Industrial Supply Company, manufacturers' representative, has been announced by Dodd Mauldin, and headquarters have been established in Los Angeles at 810 Santa Fe St., and in San Francisco at 648 Howard St. The company is exclusive representative in California of The Master Electric Company, Dayton, Ohio, the Louis Allis Company, Milwaukee, Wis., The Atlas Leather Company, Caseyville, Ill., and the Lovejoy Tool Works, Sola Corporation, and The Chicago Rawhide Manufacturing Company, all of Chicago. A complete stock of the lines listed will be carried in both San Francisco and Los Angeles.

Dodd Mauldin, formerly with the United States Electrical Manufacturing Company, of Los Angeles, is in charge of the Los Angeles office. R. D. McCrea, formerly branch manager in Portland for the United States Electrical Manufacturing Company, is in charge of the San Francisco office. James L. Mauldin, Jr., formerly with the Frigidaire Corporation in Los Angeles, is Los Angeles office manager of the Dodd Company.

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INTERMOUNTAIN MAJESTIC COMPANY Denver, has been appointed distributor in Colorado, Wyoming and New Mexico of the porcelain washers, ironers, and electrotable manufactured by Altorfer Brothers Company, Peoria, Ill.

TO DISTRIBUTE NORGE REFRIGERATOR—General Distributors, Vancouver, B. C., has been appointed British Columbia distributor of Norge Electric Refrigerators.

G. E. Building $1,000,000 Plant in Cleveland

First unit of a $1,000,000 plant for the General Electric Company is now being constructed in Cleveland and will be completed Aug. 1. The plant will occupy a 23-acre site in Euclid, ten miles east of downtown Cleveland and about three miles from Nela Park, and will employ 1,000 workers.

All the wire filament for incandescent lamps and all the gases used in all works of the National Lamp Company will be made in the new plant. An argon department and oxide house will be included as separate units, and there will also be a boiler house 80 x 180 ft. in size.

A definite upturn in business and the fact that building costs are the lowest in years are given by G. E. as its reasons for deciding to start expansion projects at this time. Daily output of incandescent lamps has been increasing since October; the company is still 200,000 lamps behind in orders.

Diamond's California Major-domos

Jesse J. Mitchell (right), whose addition to the San Francisco sales staff of the Diamond Electrical Manufacturing Company, Ltd., was announced last month, has now been made manager of the company's San Francisco branch. Al Schueler (left), is Diamond sales manager in Los Angeles. Both men were formerly with the Square D Company in Detroit

OTTO DEMMERT, of The Demmert Company, 106 W. Third St., Los Angeles, has announced that his son, Henry Demmert, is now associated with him in the manufacturers' agency business in southern California and Arizona, where the firm represents the I-T-E Circuit Breaker Company, Sundh Electric Company, Clark Controller Company, Burke Electric Company, and Southern States Equipment Company. Henry Demmert has spent the last six months in the research laboratories of I-T-E Circuit Breaker Company in Philadelphia.

I-T-E CIRCUIT BREAKER COMPANY has appointed the Phillips-Henderson Company, Ltd., Bekins Building, Vancouver, B. C., as its representative in British Columbia.

STERLING ELECTRIC MOTORS, INC., has moved its San Francisco offices, formerly at 7 Front St., to new and larger quarters at 106 Seventh St., San Francisco.

ELECTRICAL ENGINEERING SALES COMPANY, manufacturers' agent in Los Angeles, removed its offices from 426 South Spring St., to 417 South Hill St. on May 1. Among the lines represented are those of The States Company, Morganite Brush Company, and the Weston Electrical Instrument Company.

W. W. KIRK, who represents Delta-Star Electric Company, Niagara Electric Improvement Corporation, Corning Glass Works, and Portable Light Company, in Los Angeles, has announced the removal of his office and warehouse to 415 Wall St.

HATFIELD RUBBER WORKS, INC., of Hillside, N. J., has changed its name to Hatfield Wire and Cable Company. The company, whose activities were formerly confined to the manufacture of lamp cords, fixture wires, and radio wires, is now making a complete line of rubber-covered and lead-covered cables. Warehouses are maintained in 28 cities.

Noma Corporation Opens Pacific Coast Branch

A Pacific Coast branch office, showroom and warehouse have been opened by The Noma Electric Corporation, of New York, at 667 Howard St., San Francisco, for the purpose of supplying the stock requirements of the large number of distributors in this territory of the decorative lighting equipment manufactured by the Noma corporation.

Joseph Thieben, who for many years has been connected with this field of activity in California, is in charge, with George R. Simon as his assistant.

ANOTHER RADIO DISTRIBUTOR HANDLING REFRIGERATORS—One of the many radio jobbers and distributors who have taken on agencies for electric refrigerators is Pacific Wholesale Inc., Sparton radio distributor in southern California. The company has acquired the agency for the Holbrook Refrigeration Company, whose factory is in Los Angeles, and practically every Sparton dealer in southern California now is a Holbrook dealer also.

SHERMAN, CLAY & COMPANY, music dealers of San Francisco, have been appointed northern California distributors of the domestic refrigerators manufactured by the Kelvinator Corporation. George Marsch is in charge of this department of Sherman, Clay & Company.

E. H. FISHER, sales manager of the Pacific Wire Rope Company, Los Angeles, spent some time in San Francisco in May at the offices of Maydwell & Hartzell, distributors in northern California for the Pacific Wire Rope Company's products.

Piling Up a Fair-Sized Order

$125,000 worth of suspension insulators were manufactured by Westinghouse at its Emeryville, Calif., plant for the Pacific Gas and Electric Company's Tiger Creek-Salt Springs transmission line to Newark Substation. Twelve freight cars were required for shipment of the insulators

New Products

New Easy Washer

A two-tub, damp-dryer Easy washer that may be had in vacuum-cup or agitator type is announced by the Syracuse Washing Machine Corporation, Syracuse, N. Y.

The capacity of this machine is 8 lb. of dry clothes. Features of construction are the attractively designed streamline base, with all machinery hidden from view; graceful legs of Queen Anne design; chromium plated control handles; and new double-locking safety cover. Both tubs are enameled inside and out in beige porcelain. No sharp corners or crevices are present, thus facilitating reconditioning, and all surfaces, it is pointed out, are gracefully curved so that the entire surface is accessible for easy cleaning and polishing.—ELECTRICAL WEST, June 1, 1931.

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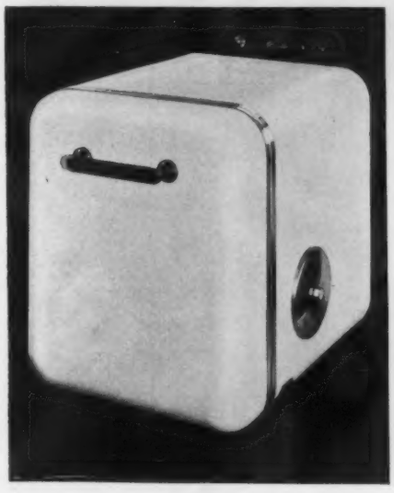
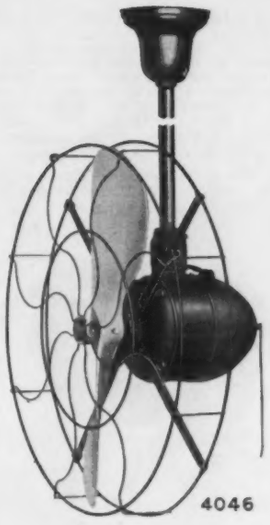
Electromaster Oven

A domestic electric oven of large size, suitable for a variety of uses, is announced by Electromaster Inc., Detroit. The oven occupies a space 24 x 18 x 27 in.; its interior measurements are 14¾ x 13 x 19 in. It is equipped with full automatic control, has a 2,000-watt heating element, and can be wired for 110 or 220 volts. The outside finish is percelain enamel in either white or eye-rest green. Heavy chromeplate is used for the oven interior. Baking, roasting and broiling facilities are provided in this model BO-1 oven, which is designed for cooking classes, small lunch stands, apartments, for hospitals and clinics as a sterilizer, and for general bacteriology.—ELECTRICAL WEST, June 1, 1931.





Emerson Tornado Fan

Although primarily intended for ceiling mounting, the new "Tornado" fan of the Emerson Electric Manufacturing Company, St. Louis, Mo., can be inverted for mounting on a pipe and used as a column fan without the necessity of changing any parts of the motor.

The fan has a two-blade airplane type propeller, 23 in. in diameter, with a free air capacity of 3,500 cu.ft. of air per minute. A ceiling canopy and hickey with lag screw for fastening to wood ceiling are regularly supplied but no hanger pipe is included. A special feature is the adjustable mounting yoke which permits the fan to be tilted to any position between 15 deg. above horizontal to 30 deg. below horizontal. Guard, motor and fittings are finished in black enamel and aluminum blades are in natural finish. The fan is made for 110 volts, 60 cycles and is listed at $50.—ELECTRICAL WEST, June 1, 1931.

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New Chromalox Units

Speed, efficiency, safety, long life, and easy installation are features claimed for the "super-speed" range units just brought out by Edwin L. Wiegand Company, 7525 Thomas Blvd., Pittsburgh, Pa.

Made in wattages of 1,000, 1,200, 1,500, and 2,000 watts, in sizes to fit every make of range, these new units can be used to replace other elements by merely lifting out the old unit and slipping in and connecting the Chromalox super-speed unit. The smooth, flat, fully enclosed tops of these units protect both the heating element and the operator, and give a neat appearance to the range. Cooking efficiency is increased through direct contact of the utensil with the chromium alloy heating surface of the units, and, acording to the manufacturer, they are more economical in the use of electric current. Prices range, according to wattage, from $6.90 to $8.75. —ELECTRICAL WEST, June 1, 1931.

Electrodrip Coffee Pot

A handsome appliance for making drip coffee is the new Electrodrip brought out by the Robeson Rochester Corporation, Rochester, N. Y.

The Electrodrip will make six cups of coffee, and its operation is simple. After inserting filter paper and placing the desired amount of coffee in the upper container, boiling water is poured in, which drips slowly and evenly through the coffee. It is necessary to filter it through only once. The top part then can be removed and the cover placed on the pot. A contained heating element keeps the coffee always at the proper drinking temperature, never permitting it to boil.

For iced coffee, the pot can be unlocked from the base and set in the ice box, or the same coffee can be reheated by merely locking the pot again to the base and turning on the current. Retail price, $10.—ELECTRICAL WEST, June 1, 1931.

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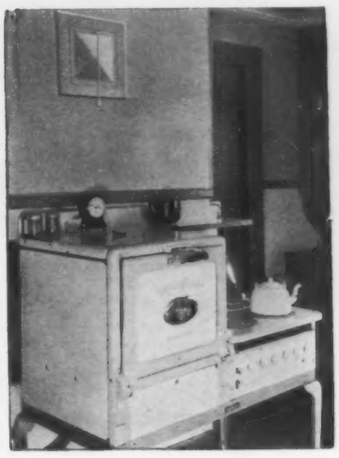
Home Ventilating Fan

An 8-in. home ventilating unit has been introduced by the Buffalo Forge Company, Buffalo, N. Y., to provide ventilation for bungalows, apartments, kitchenettes, and other small rooms. A space 13 in. square is sufficient to install this ventilator, and it has a neat appearance both inside and outside the building.

Operation is extremely simple. A slight pull on the enameled rod opens both outside and inside doors to ventilation and starts the motor, and similarly a gentle push on the rod closes both doors and shuts off the motor. Suitable springs which hold the doors under tension prevent the possibility of rattling doors. The motor has no switches, brushes or starting mechanism to get out of order, and need only be oiled once a season. The unit is available for 110-volt, 60-cycle current only. Retail price, complete with 8-in. fan, $45; fan and motor only, $30.—ELECTRICAL WEST, June 1, 1931.



Armored Weatherproof Cable

A considerable reduction in the cost of service entrances is claimed through the use of a new flexible armored weatherproof cable just announced by General Cable Corporation. The new cable is designed to take the place of individual wires and rigid conduit formerly used from the point of attachment of the aerial conductors on the building to the service entrance switch.

The new cable, structurally, is a combination of several features of Trenchlay (non-metallic underground cable), Parkway and Aerial cables. Three rubber-covered and braided wires are cabled and sealed against moisture by an asbestos base caulk. A braid over all three of the conductors is saturated with a special compound. An interlocking galvanized steel tape armor is then applied to give the necessary mechanical strength, and another treatment of caulk protects this armor from moisture. The final braid also is treated with weatherproof compound and the complete cable is finished in Romoxide, a sun-ray resistant compound.

The cable is extremely flexible and is easily bent around projections or other irregularities on the side of the building. Only a few simple metal straps are required to hold it in place; no fittings are necessary, and only standard squeeze connectors and weatherheads are required.—ELECTRICAL WEST, June 1, 1931.

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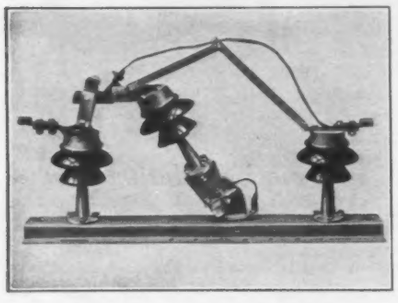

Pole Top Switches

For light branch line construction where very moderate loads are to be controlled, the Pacific Electric Manufacturing Corporation, San Francisco, has developed an inexpensive switch with a rating of 200 amp. Through the use of pressed steel parts in this switch, the advantage of lightness is gained without sacrificing strength, according to the manufacturer.

The blade of this switch has a hinged motion which acts as an ice or sleet breaking feature, insuring the operation of the switch in the severest weather. The rocker shaft acts as a counter-weight to the insulators and is mounted in such a way that it does not pass through the bearing, permitting the use of a small diameter bearing with consequent reduction of friction.

These switches are furnished in voltages from 7.5 to 34.5 kv. with standard cemented cap insulators with 3-in.-bolt circles admitting of replacing of insulators from stock.

Complete protection from radio interference is provided, and all switches are equipped for locking in closed and open position, and with adjustment in the control to offset possible inaccuracy of installation on wooden structures.—ELECTRICAL WEST, June 1, 1931.

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Improved Electrode

An improved electrode for the arc welding of stainless steel is now in manufacture by The Lincoln Electric Company, Cleveland, Ohio. The electrode, to be known as the "Stainweld A," is an extruded electrode used with the usual polarity of welding current reversed. The coating contains no carbon; thus all possibility of the molten weld metal absorbing carbon from the electrode coating during the welding process is eliminated. As a result, the carbon content of weld metal deposited by this electrode will always be equal to or less than the carbon content of the stainless steel being welded. "Stainweld A" electrodes are manufactured in 3/32-in., ⅛-in., 5/32-in., 7/32-in., and ¼-in. sizes of the regular 11-in. lengths.—ELECTRICAL WEST, June 1, 1931.

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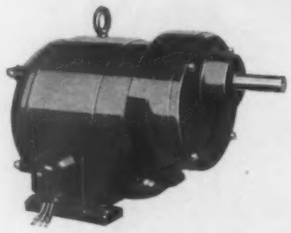

Parallel and Right Angle Shaft Motors

Geared-head motors in both parallel shaft and right angle shaft types are announced by The Master Electric Company, Dayton, Ohio. Motors of both types are built in sizes from 1/30 to 5 hp. single phase and d.c.; 1/30 to 20 hp. polyphase with interchangeable frames for the same horsepower and speed in different types of current.

The parallel-shaft type motor is available in multiples of 0.25 for any ratio between a maximum reduction of 6:1 and a maximum acceleration of 2.5:1 of standard motor speed. Standard ratios on which prompt delivery of the right angle shaft type motor can be made are 8:1, 12:1, 18:1, 24:1, 30:1, 36:1, 48:1, 60:1, and 72:1.—ELECTRICAL WEST, June 1, 1931.

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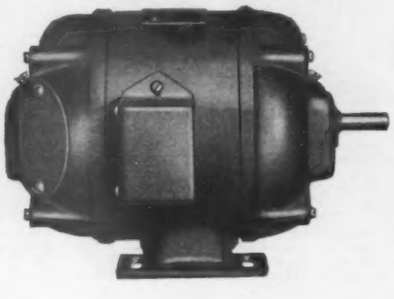
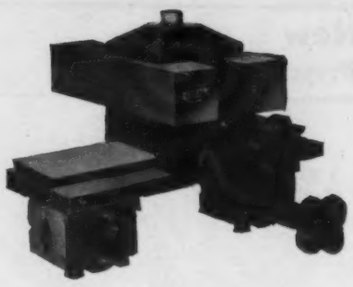
Fractional Horsepower Motors

A new line of fractional horsepower motors with mounting dimensions interchangeable is being made by the Century Electric Company, St. Louis, Mo., in repulsion-start split-phase and single-phase, squirel cage polyphase, and d.c. types.

The bearing brackets of this design offer unusual protection against falling objects, dirt, or dripping water. These motors have rolled steel frames, welded steel feet, slotted for belt adjustment, and bearings machined from phosphor bronze castings. They are equipped with a wool yarn system of lubrication.—ELECTRICAL WEST, June 1, 1931.

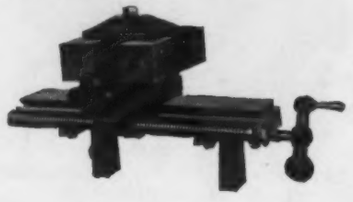




Improved Grinders

The "screw" in an improved model of its Perfect model grinder recently introduced by the Ideal Commutator Dresser Company, Sycamore, Ill., is now located in the back of the bed plate instead of in the center, thus reducing chances of binding caused by the grindings being thrown upon it. The head now rides on a solid plate, rather than on rails, making possible more precise adjustment, and the stone tools now are held by one plate, which assures a more rigid hold than the two clamps.

Changes also have been made in the company's Ideal model grinder, the rack gear of which has been reversed to lessen possibility of binding. A star knob handle replaces the former wheel or lathe type handle of this model.—ELECTRICAL WEST, June 1, 1931.



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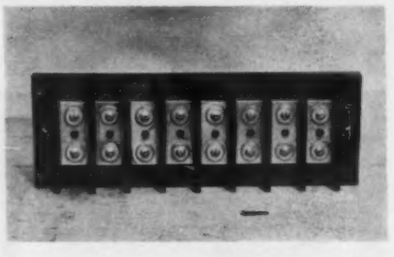
Relay Terminal Block

A relay terminal block built of laminated canvas Spauldite (Bakelite) has just been placed on the market by C. D. LaMoree, 1325 San Julian St., Los Angeles. The block is wider than usual and sufficient room is provided between terminal chambers to permit the use of as large as No. 8 wire. Binding head screws are used, which eliminate the necessity of washers. All metal parts are cadmium plated.

The block is made in four-, eight-, and twelve-terminal sizes. Retail price of the eight-terminal size is $4.—ELECTRICAL WEST, June 1, 1931.



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Portable Current Transformer

A portable current transformer for general purpose testing has been announced by the General Electric Company. Designated as type PR-1, the transformer measures 3⅝ x 9¼ in., with a height over terminals of 9⅞ in. Weighing only 13 lb., the transformer is provided with a convenient carrying case and is easily handled. Ratings are up to 1,100 amp. in a series of eleven steps. Secondary rating is 5 amp. The transformer is suitable for use on 2,500-volt, 25- to 125-cycle circuits.—ELECTRICAL WEST, June 1, 1931.

Load Test Set

A recently developed load test set with clamping transformer, especially designed to be used over either a cable, bus bar, or blade of knife switch, has been announced by the Electrical Engineering Sales Company, Los Angeles. It may conveniently be used in a very limited space. The opening of the transformer is sufficiently large to enclose a cable 1¼ in. in diameter or a bus bar 2½ in. wide. This set consists of a split-core current transformer and a Weston model 433 ammeter complete with connecting cable and plugging device.

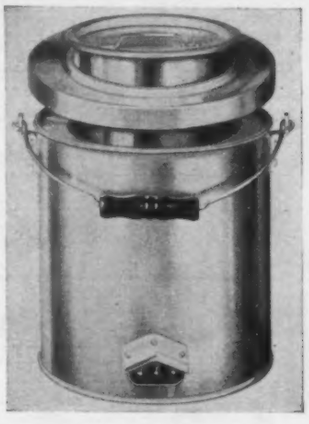
A plug and cartridge fuses are furnished so measurements can be easily made on any circuit without having to cut into the line. The set has four ranges, running from 0-12½, 0-50, 0-150, and 0-600 amp. Changing from one range to another is accomplished by pulling the ammeter plug, rotating it to the proper position, and re-inserting it. The complete outfit is furnished with a two-compartment leather carrying case, designed to carry all of the parts. List price of the complete set is $120. Larger ranges can be furnished by the manufacturer.—ELECTRICAL WEST, June 1, 1931.

Electric Glue Pot

Even distribution of heat from top to bottom keeps glue at just the proper consistency for use in the Everhot electrical glue pot just developed by The Swartzbaugh Manufacturing Company, of Toledo, Ohio. The sides of the glue container are entirely surrounded by an Everhot electric element. Heat variation is provided for; after the glue is liquified at high temperature, the current consumption is reduced and an even minimum temperature is maintained.

Heavy gage galvanized steel is used for the outer body of the pot; compartment and utensil are of heavy gage copper, and both the container and the cast-iron collar surrounding it are easily removable for cleaning.

With a capacity of four quarts, the glue pot stands 11¾ in. high and is 12½ in. in diameter. Packed for shipping, it weighs 26 lb. The pot may be used on either a.c. or d.c., and can be furnished in any voltage. Intended retail price, $18.50.—ELECTRICAL WEST, June 1, 1931.



Five-watt Mazda Lamp

In order to meet the demand for a very small, standard voltage Mazda lamp to be used in the many lighting ornaments for the home, and in signaling devices such as in hospitals and elevator annunciators where heretofore carbon lamps were the only types available, the Nela Park lamp development laboratories of the General Electric Company have produced a 5-watt lamp that is more efficient and economical to operate. The lamp has a straight-sided bulb ⅝ in. in diameter. Maximum over-all length is 1⅞ in. The rated life of the lamp is 1,500 hours. Retail price, 30 cents.—ELECTRICAL WEST, June 1, 1931.

Trade Literature

¶ HOTPOINT SUPPLY PARTS—Its supply parts catalogs covering commercial cooking equipment has been completely revised by the Edison General Electric Appliance Company, Inc., Chicago. Sections No. 801 and No. 852 of the catalog, just issued, replace sections No. 800 and No. 851. They cover respectively pantry and counter equipment, and commercial cooking equipment.

¶ AUTOMATIC CONTROL INSTRUMENTS—Recording, signaling, indicating, and alarm controllers for temperature, pressure, flow, etc., manufactured by The Brown Instrument Company, Philadelphia, are described, and their use in various applications illustrated in the company's catalog No. 8008.

¶ CONDULET CATALOG—A new catalog of threadless condulets, couplings, and connectors for rigid conduit and electrical metallic tubing has been issued as Bulletin No. 2218 by the Crouse-Hinds Company, Syracuse, N. Y.

¶ PROTECTED MOTORS—"Mica Bestos" insulated motors are the subject of an illustrated folder being distributed by the Los Angeles office of Sterling Electric Motors, Inc., 6401 Telegraph Road.

¶ DEAD FRONT SWITCHBOARDS AND INDUSTRIAL SAFETY SWITCHES—A new bulletin dealing with dead front switchboards has been published by the Square D Company, Detroit, for distribution to architects, industrials, school officials, etc. A recent pamphlet of this company is devoted to its industrial safety switches. Copies of the bulletin (CA-508) and of the pamphlet may be procured from the offices of the Diamond Electrical Manufacturing Company, of Los Angeles and San Francisco, which is affiliated with the Square D Company.

¶ INDICATING CONTROLLER—The Brown Instrument Company, Philadelphia, has published a broadside describing and illustrating its new indicating control instrument for automatically controlling relatively high temperature processes and units such as heat treating furnaces, enameling furnaces, oil stills and towers, brick and pottery kilns, glass furnaces, galvanizing tanks, etc. A copy of this broadside will be sent by the company to any industrial executive who desires it.

¶ CARBON BRUSH MANUAL—A new pyramid brush catalog of the National Carbon Company, Inc., Cleveland, has been designed to simplify the selection and specification of carbon graphite, and metal-graphite brushes for generators, motors, and rotary converters. The new shunt nomenclature of the National Electrical Manufacturers Association has been adopted in this catalog section No. B-131.

¶ PIPE FITTINGS AND PRESSURE GAGE—Dieform compression fittings for copper or steel tubing for small service lines are the subject of Bulletin No. 13 now being distributed by the Bailey Meter Company, Cleveland. One section of the bulletin describes Dieform test water cooling coils with which boiler test water may be obtained. Bulletin No. 70 of this company, just released, describes and illustrates its power type presure devices.

¶ AUTOMATIC IRONERS—Engineering specifications on Conlon cabinet automatic ironers are set forth in a recent folder issued by the Conlon Corporation, Chicago. A circular on the company's model No. 131 washer and another on the cabinet ironer have also been issued recently. All three pamphlets are available free in any quantity desired for sales organizations of dealers or distributors.

¶ RANGE HEATING UNIT—A new Hotpoint 2,100-watt 8½-in. Calrod heating element was announced recently to dealers by the Edison General Electric Appliance Company, Inc., Chicago, by means of a broadside. The inside of the broadside was designed as a store and window display poster, and directions for its use accompanied it.

¶ POLE-TOP SWITCHES AND FRAME-MOUNTED OIL CIRCUIT BREAKERS—Bulletin No. 36, describing type PS-1 pole-top switches, and Bulletin No. 37, devoted to a 69-kv. multi-break, frame-mounted, oil circuit breaker manufactured by the Pacific Electric Manufacturing Corporation, 5815 Third St., San Francisco, are available for distribution.

¶ AIR COMPRESSORS—"Four Air Compressors Went to School" is the unique title of a 16-page bulletin just issued by the Davey Compressor Company, Kent, Ohio. The publication describes how the company's air-cooled compressor won honors in a 500-hour non-stop test.

¶ PUMP CATALOG—A complete presentation of the deep-well turbine pumps of the Layne & Bowler Corporation, 900 Santa Fe Ave., Los Angeles, for industrial, municipal, and irrigation service is offered in the company's 96-page catalog, just published.

¶ WASHERS AND IRONERS—A new 1931 catalog of Thor washers and ironers has been furnished their dealers by the Hurley Machine Company, Chicago. The catalog is designed primarily as a sales manual for Thor salesmen.

¶ INSULATOR TEST—Specific results of a test conducted on Locke standard 18,400 suspension type insulators by an operating company are given in tabular form in a mailing piece recently distributed by the Locke Insulator Corporation, Baltimore, Md.

Barometer

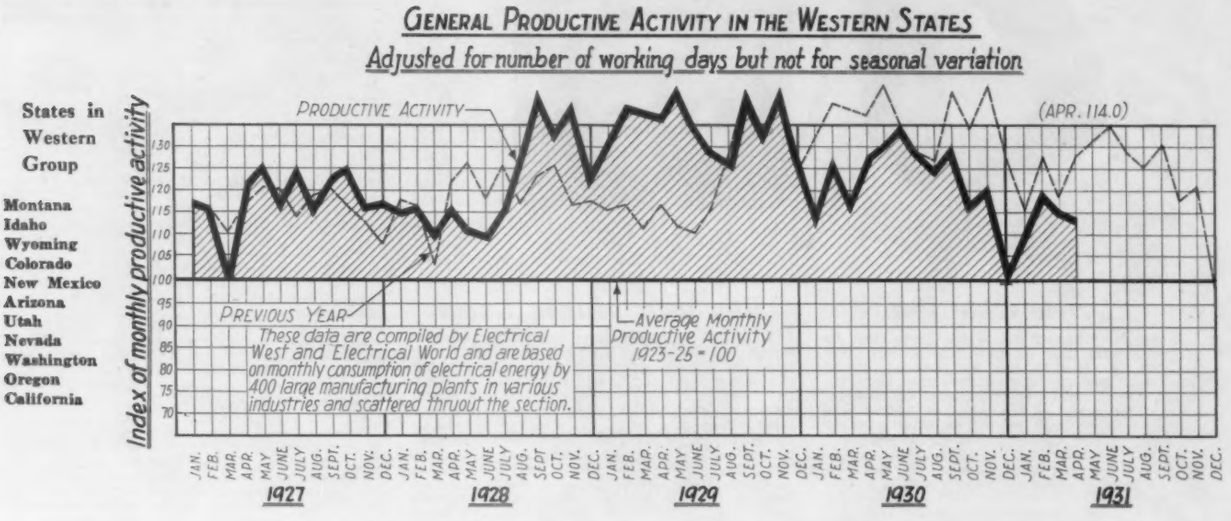
WESTERN industrial operations in April were at nearly the same level as in March, according to reports of electrical energy consumption by manufacturing plants. There was a decline of 11 per cent compared with 1930, but a close approach to the activity of April, 1928.

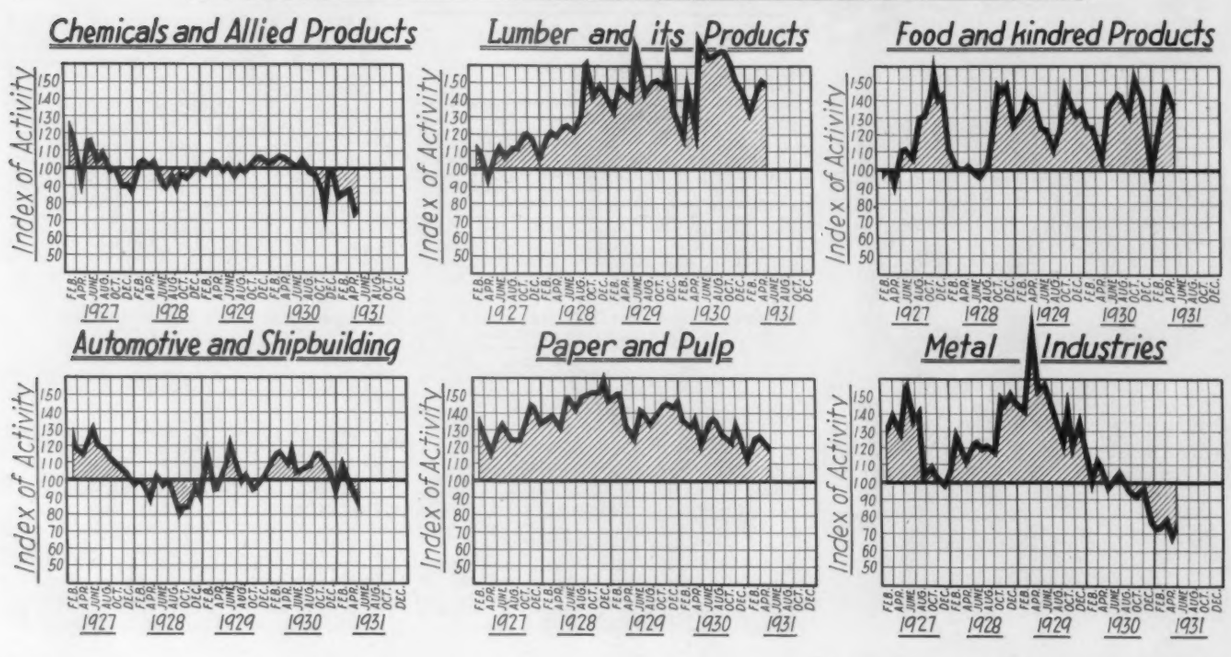
Most of the industry groups show a slight decrease from March. Food products, though down from the previous month, are slightly higher than in April, 1930. The stone, clay, and glass group, which in most sections is strongly affected by activity in the cement industry and so in a measure reflects construction work, remains even with March and 3 per cent above last year. The metals group, also affected by demands for construction, rose about 10 per cent from its unusually low March level, returning to that of December and January, about 23 per cent lower than at this same season last year.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days.)

	April 1931	March 1931	Feb. 1931	April 1930	Average First Four Months 1931	Average First Four Months 1930
All industry	114.0	115.7	120.0	127.6	115.2	121.9
Chemical and allied products	75.2	71.8	85.7	103.7	78.8	107.7
Food and kindred products	138.1	148.4	149.3	136.3	140.4	124.5
Forest products	150.1	152.1	146.0	167.8	146.3	146.2
Metals group	71.4	64.1	74.4	92.5	70.3	103.2
Paper and pulp	120.6	125.3	128.3	123.0	115.0	142.7
Rubber and its products	155.6	155.0	173.0	168.2	160.1	166.7
Shipbuilding	82.0	88.7	.....	122.2	.....	116.8
Stone, clay, and glass	94.6	94.9	108.0	91.5	99.8	98.1





FRIGIDAIRE'S INDIVIDUALIZED SALES SERVICE is available to any PUBLIC UTILITY COMPANY

Frigidaire offers you INDIVIDUALIZED SALES SERVICE as complete as the Frigidaire line itself

Frigidaire's Individualized Sales Service is available to any Power Company . . . It has met with an enthusiastic reception from executives of Public Utility Companies all over the country

It is *individualized*—made to fit into the peculiar requirements of each company—and it is *complete*.

Frigidaire individualized sales service includes help in planning campaigns or contests. It includes direct mail literature, newspaper advertising, outdoor advertising, window and store displays, and radio broadcasting.

This service has many advantages—aside from the fact that it is individualized. It saves the time of power company executives. It gives each company the benefit of the experiences of other companies. It is flexible.

We will be glad to give the executives of any power company full details of the Frigidaire individualized sales service plan. A letter will bring this information.

* * *

Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, O.

FRIGIDAIRE

A GENERAL MOTORS VALUE

FOR years one of the most profitable factors in the Frigidaire franchise has been the completeness of the Frigidaire line of products.

Frigidaire equipment to meet almost every refrigeration need—both household and commercial—has made it possible for dealers to do a year 'round business with excellent profit.

Frigidaire gives the same advantage to power company dealers and, in addition, now offers them sales service cooperation which has proved exceedingly valuable.

Frigidaire household cabinets are available in a wide variety of models ranging in capacity from three to eighteen cubic feet. All are finished, inside and out, in lustrous white Porcelain-on-steel.

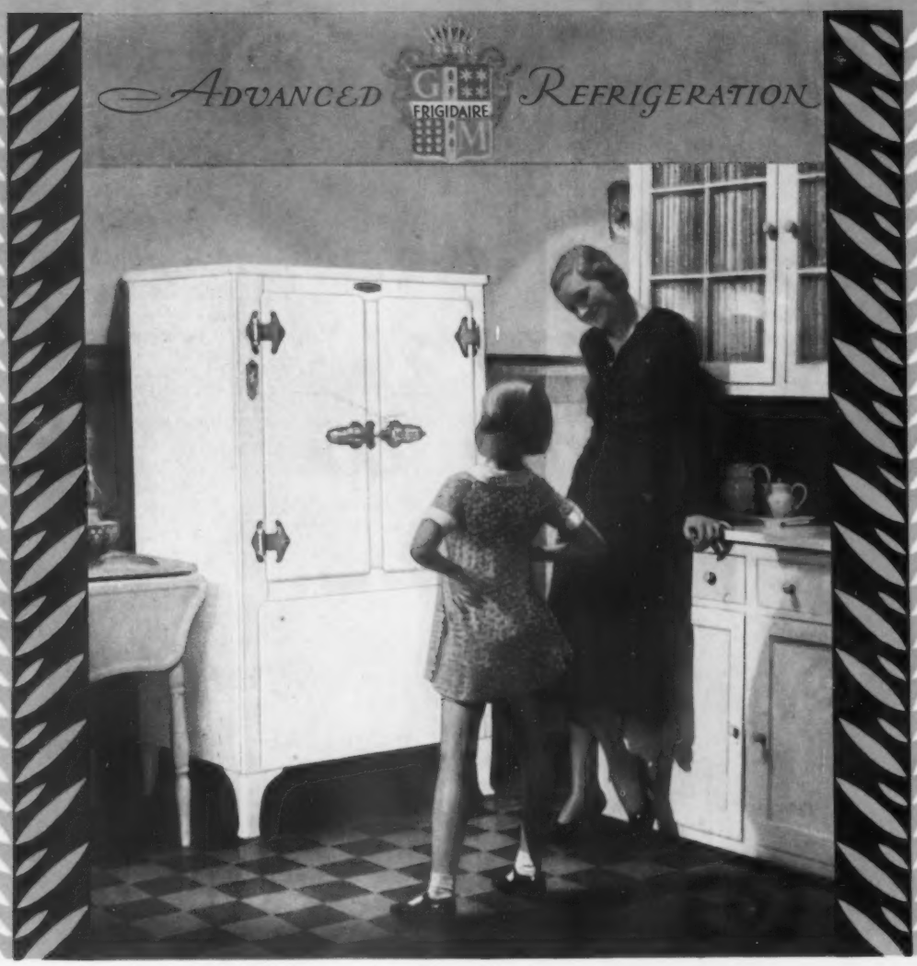
★ ★ ★

Wherever refrigeration is needed, markets, groceries, delicatessens, hotels, clubs, restaurants, florists, schools, colleges, stores and institutions of all kinds, there is Frigidaire equipment exactly suited to all requirements. Frigidaire is so flexible that it may be adapted to fixtures now in use. As refrigeration needs increase, additional Frigidaire units may easily be installed.

Frigidaire Water Coolers automatically provide an abundance of cool, refreshing water at low cost. There are models for use with bottled water and for connection to city water lines. A tremendous and profitable market exists for Frigidaire water cooling equipment in business offices of all kinds as well as in factories, mills, schools and institutions.

The Frigidaire Room Cooler not only cools warm room air, but washes and circulates the cooled air uniformly. It also decreases humidity by absorbing excessive moisture. In homes, hospitals, conference rooms—wherever warm-weather-comfort is paramount—the Frigidaire Room Cooler offers advantages that are readily apparent to all.

Frigidaire Milk Cooling Equipment is so constructed that it may be conveniently and inexpensively installed in any approved tank-type cooler. Frigidaire equipment can also be used to refrigerate large milk storage rooms and to chill brine used in aerators. It reduces labor costs, saves time, stops spoilage losses and keeps bacteria count low.



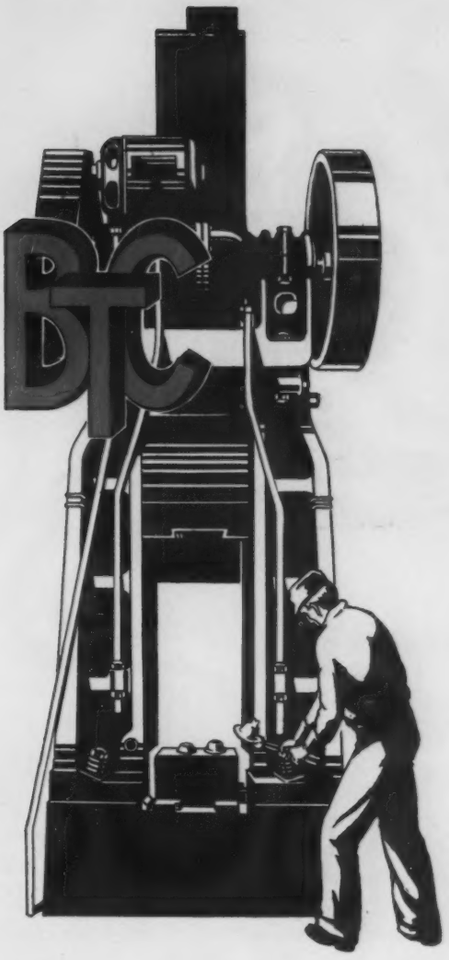
These Outstanding Advantages make Frigidaire easy to sell

1. A cabinet of Porcelain-on-steel inside and out.
2. Seamless, stainless Porcelain interior.
3. Accessible exterior "Cold Control."
4. The famous Hydrator.
5. The Quickube Ice Tray.
6. A quiet, concealed mechanical unit.
7. Surplus power to meet every refrigeration need.
8. A smooth, flat, service-shelf top.
9. Legs or casters.
10. Conveniently elevated bar-type shelves.

And in addition to a complete line of household models, Frigidaire also offers a complete line of commercial refrigeration equipment — a Frigidaire for every home and every place of business.

FRIGIDAIRE

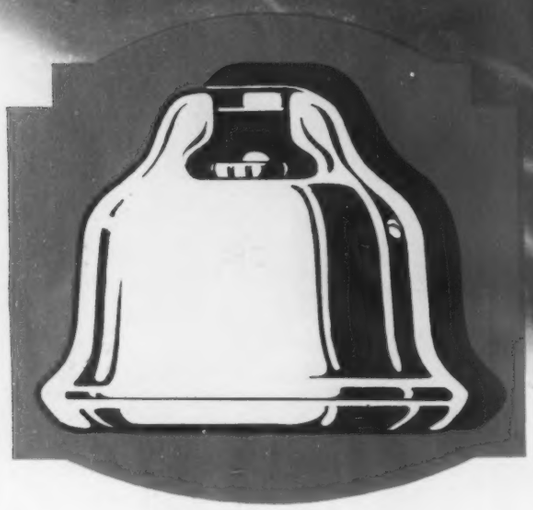
A GENERAL MOTORS VALUE



Drop Forged High Tension Suspension Line Hardware

THE BREWER-TITCHENER CORPORATION
Cortland, New York

SOLD ONLY THROUGH THE INSULATOR MANUFACTURER



BTC

THIS is the day of specialization. Years of production and constant study have enabled the B.T.C. cap to assume leadership in the industry — it is Specialization. New buildings and facilities are entirely devoted to the manufacture of hi-line hardware. Sales Engineers are constantly contacting both insulator and utility men. That this effort is appreciated by the engineer is best evidenced in the ever increasing popularity of the drop forged cap.

WE term this cap extra protection, for it is an added margin of safety, offered to the engineer by merely specifying a B.T.C. drop forging. Such specification insures — Copper Bearing Steel, the finest rust-resisting metal known — Absolute uniformity and dependability — Strength and accuracy of measurement. Insist on this protection.

The Brewer-Titchener Corporation
Cortland, New York

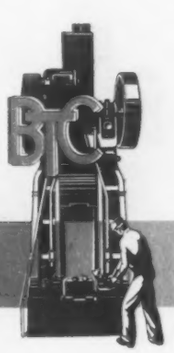
ASK YOUR INSULATOR MANUFACTURER

Drop Forged

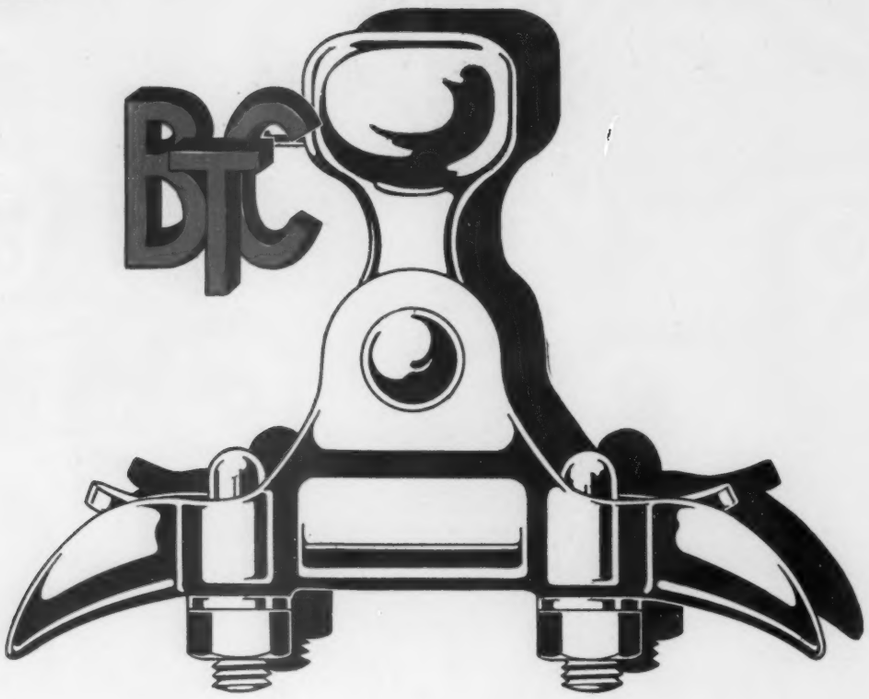
IT is common knowledge in the electrical field that The Brewer-Titchener Corporation is one of the largest forging and stamping concerns in the east. May it be said with pardonable pride that every move made in the electrical field has been preceded by careful research. In view of such study and the success of the forged cap, a full line of clamps and hi-line hardware is now at the disposal of the engineer through his own insulator manufacturer. Such a line offers the buyer a high standard forging, obtainable by request and carrying the protection only a forging can offer.

ALL B.T.C. drop forged hardware is made from S.A.E. 1035 Copper Bearing Steel and hot dip galvanized to the most severe specifications. Put your hardware on a par with the rest of the line, specify B.T.C. Drop Forgings.

The Brewer-Titchener Corporation
Cortland, New York



FOR BTC DROP FORGED HI-LINE HARDWARE



Pressed Steel
Suspension Clamps

DUE to its immense stamping facilities the B.T.C. line has added this pressed steel clamp — a radical departure in clamp manufacturing. Stamped from Copper Bearing Steel, it presents a clamp of exceptional strength, adequate to all but the heaviest construction requirements — yet at a low price. It is a clamp that will meet with popularity for general use; especially where price is a factor. The engineer will find its many features of interest. Write for the clamp catalogue describing it in detail.

THE BREWER-TITCHENER CORPORATION
Cortland, New York

SOLD ONLY THROUGH THE INSULATOR MANUFACTURER

EVERY PUBLIC UTILITY REPRESENTATIVE SHOULD VISIT THE FRIGIDAIRE EXHIBIT AT THE N.E.L.A. CONVENTION

THERE ARE 2 VITALLY IMPORTANT REASONS WHY

★ ADVANCED REFRIGERATION ★

N. E. L. A. CONVENTION ● STEEL PIER ●
ATLANTIC CITY ● JUNE 8-12 ● 1931 ●

FIRST—NEVER BEFORE HAS FRIGIDAIRE SHOWN SUCH OUTSTANDING VALUES IN HOUSEHOLD MODELS

●

THE LAST WORD IN TRULY ADVANCED REFRIGERATION

There are many angles from which to judge an electric refrigerator—but no matter from what angle these new Frigidaires are viewed—the verdict must be the same—Outstanding.

IN DESIGN—beautiful, yet simple, classic lines that suggest their utilitarian purpose. They look like a refrigerator should look.

IN FINISH—sparkling white Porcelain-on-steel throughout; massive, chastely designed hardware.

IN CONVENIENCE—roomy interiors; elevated, bar-type shelves; flat, usable top; easily accessible "Cold Control"; the Hydrator; the Quickube Ice Tray.

IN EFFICIENCY—quiet, dependable mechanism capable of maintaining safe low temperatures regardless of outside conditions; fast freezing compartments.

IN ECONOMY—low-cost operation that puts extra meaning into the phrase "Invest in An Electric Refrigerator."

See these outstanding electric refrigerators. Never before has Frigidaire offered so much in true value.

FRIGIDAIRE
A GENERAL MOTORS VALUE

N. E. L. A. CONVENTION ● STEEL PIER ●
ATLANTIC CITY ● JUNE 8-12 ● 1931 ●

SECOND—FRIGIDAIRE WILL HAVE AN UNIQUE DISPLAY OF ITS INDIVIDUALIZED SALES SERVICE . . . OF VITAL INTEREST TO EVERY UTILITY REPRESENTATIVE

●

Merchandising plans are not new, but every utility man will be greatly interested in the methods by which Frigidaire has cooperated with public utilities in merchandising electric refrigeration.

Frigidaire's service is individualized—made to fit exactly into the peculiar requirements of each utility company. Its sales plans are made to harmonize perfectly with company policy.

In the Frigidaire exhibit utility men will be shown concrete examples of Frigidaire Sales Service—campaigns; contests; direct mail literature; prospectuses; advertising; radio broadcasting; outdoor, window and store display; selling helps of every description.

Every utility representative who sees this exhibit will instantly realize that Frigidaire's Sales Service effectively does the two major things it has been designed and planned to do—to quickly increase power loads and to do this with the utmost conservation of the time and effort of utility executives.

FRIGIDAIRE
A GENERAL MOTORS VALUE

ADVANCED REFRIGERATION

A FEW OF THE REASONS WHY UTILITY COMPANIES HAVE FOUND FRIGIDAIRE EASY TO SELL

1 A cabinet of Porcelain-on-steel inside and out. **2** Seamless, stainless porcelain interior. **3** Accessible exterior "Cold Control." **4** The famous Hydrator. **5** The Quickube Ice Tray. **6** Quiet, concealed mechanical unit. **7** Surplus power to meet every refrigeration need. **8** A smooth, flat service-shelf top. **9** Legs or casters. **10** Conveniently elevated bar-type shelves.

And in addition to a complete line of household models, Frigidaire also offers a complete line of commercial refrigeration equipment — a Frigidaire for every home and every place of business.

★ ★ ★

And now — a 3-year complete service guarantee — covering everything — both the cabinet and the mechanical unit.

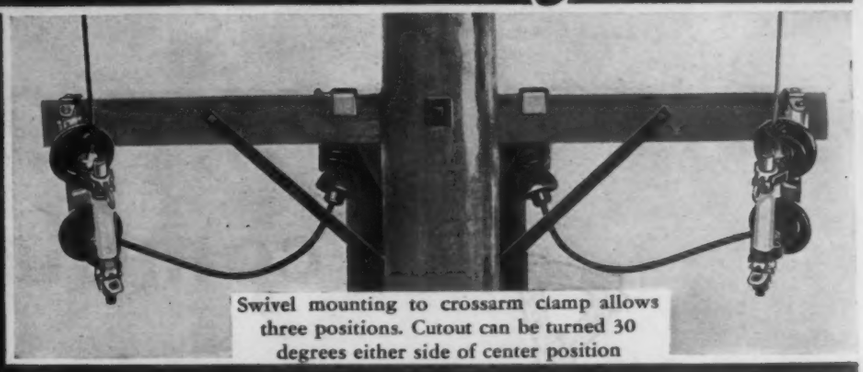
FRIGIDAIRE

A GENERAL MOTORS VALUE

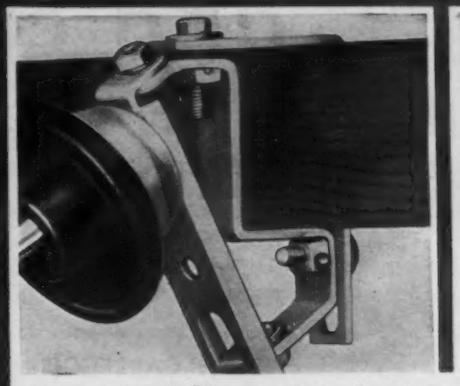
FRIGIDAIRE CORPORATION ★ SUBSIDIARY OF GENERAL MOTORS CORPORATION ★ DAYTON OHIO

Rural Distribution Systems

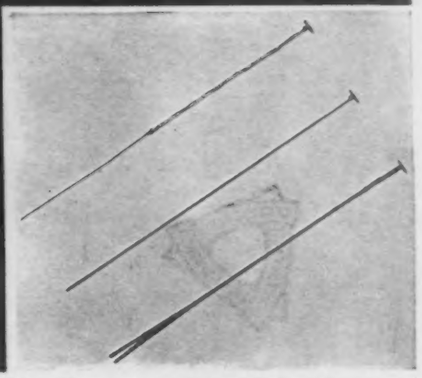
The lead support makes unnecessary a tie insulator on the lower crossarm



Swivel mounting to crossarm clamp allows three positions. Cutout can be turned 30 degrees either side of center position



Cutout is installed by removing and replacing lower bolt and tightening upper bolt; nuts are welded to hanger



A superior new fuse—low operating temperature and fast blowing

The design of these cutouts is extremely simple. Each consists of a fuseholder mounted in two sets of contacts, supported by two insulators bolted to a hanger. The two cutouts differ only in the size of insulators and the clearances and dimensions, as determined by their voltage rating.

Outstanding Features

1. Mechanical simplicity
2. Clamp-type swivel hanger, providing:
   a. Ease of installation
   b. Ready accessibility, for inspection or re-fusing.
3. Unique line-lead support, eliminating a tie insulator on the lower crossarm.
4. The fuseholder can be removed and replaced with a standard switchhook.
5. Fuses much superior to previous designs, resulting in the following operating characteristics:
   a. Low operating temperature of fuseholder.
   b. Fast blowing at all currents in the range from the minimum required to blow the fuse up to short-circuit rating.
   c. Possibility of corrosion at exposed points has been minimized.

...plete description in Bulletin ...EA-1328, which will be sent, on request, by your G-E local office.

420-33

ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

In each of 22 major cities - a complete wire and cable headquarters

GENERAL CABLE CORPORATION simplifies purchasing for the electrical industry, by concentrating in a single source the manufacture and sale of an immense variety of wires, cables and accessories.

In the past, your purchases of the products of each component company of General Cable were made through independent sales staffs selling only the products of their own plants. General Cable unifies the entire sales structure.

All representatives—themselves technically competent—now present ALL the products of ALL the twelve General Cable plants. So from any of the twenty-two District Offices you are now offered any electrical wire, cable or accessory—whatever your requirements—from finest magnet wire to largest submarine power cable.

These General Cable representatives bring you the assistance of a unified engineering staff and greatly augmented research

GENERAL CABLE

laboratory facilities. They present the widest variety of conductor materials available—with unprejudiced recommendations for specific applications. They also offer you the advantages of a widespread warehouse system, carrying adequate stocks, as well as the additional stocks of an extensive electrical wholesaler organization.

These twenty-two District Offices—each of which is General Cable Headquarters for sales and engineering service—are located in the leading industrial centers of America, for your convenience. Wherever your operations may be, one of these offices is practically around the corner.

DISTRICT OFFICES

ATLANTA 1526 Healy Bldg.			PITTSBURGH 1814 Koppers Bldg.
BIRMINGHAM 1306 Watts Bldg.	CINCINNATI 920 C. of C. Bldg.	KANSAS CITY Board of Trade Bldg.	ROME, N.Y. Mill St.
BOSTON 89 Broad St.	CLEVELAND 1814 Terminal Tower	LOS ANGELES 939 East Fourth St.	SAN FRANCISCO 465 Tenth St.
BUFFALO 56 Clyde Ave.	DALLAS 1614 Allen Bldg.	MINNEAPOLIS 109 So. Seventh St.	SEATTLE 570 First Ave. South
CHARLOTTE First Nat. Bank Bldg.	DENVER 650 Seventeenth St.	NEW YORK 420 Lexington Ave.	ST. LOUIS 1213 Ambas'dor Bldg.
CHICAGO 20 No. Wacker Drive	DETROIT 827 Fisher Bldg.	PHILADELPHIA 123 South Broad St.	WASHINGTON 704 Wilkins Bldg.

PLANTS

BALTIMORE Maryland	DETROIT Michigan	MOBILE Alabama	PERTH AMBOY New Jersey
BAYONNE New Jersey	EMERYVILLE California	PAWTUCKET Rhode Island	ROME New York
BUFFALO New York	FORT WAYNE Indiana	PENNINGTON New Jersey	ST. LOUIS Missouri

CORPORATION

Now!

CERTIFIED FACTS *about* LAPP INSULATORS

FOR the first time in the insulator industry, you can now get independently certified performance facts.

We engaged the A. C. Nielsen Company, Chicago engineers, to investigate and report on various Lapp Insulator installations. Consider Galveston, for example.

Winds from the Gulf of Mexico cause a fine salt deposit, combined with dust and dirt, dampened by heavy fog. The 33 kv. line originally had 45 kv. pin type insulators. Despite 20 annual routine cleanings there occurred frequent burning of cross arms and poles; insulators were shattered from the pin, causing line interruptions.

Then 66 kv. standard pin type insulators were installed, but surface leakage, during an unusually difficult operating period, gave rise to numerous complaints from disturbed residents. There was serious talk of doing away with the lines entirely.

Competitive insulator tests were invited. As a result, the entire island was equipped with Lapp Fog Type Insulators, No. 5805. Complaints have been entirely eliminated. Requests for removing the line have subsided. During the intervening 3 years the Lapp Insulators on 75% of the line have not been cleaned once, yet their performance is described as "entirely satisfactory."

These statements are certified by two officials of the power company. We have a limited quantity of these complete reports. Write for one.

LAPP INSULATOR CO. INC — LAPP INSULATORS — LE ROY - N.Y. - U.S.A.

Pacific Coast Representatives—S. Herbert Lanyon, 408 Call Bldg., San Francisco, Calif., and 210 Transportation Bldg., Los Angeles, Calif.
W. R. Hendrey Co., Hoge Bldg., Seattle, Wash.

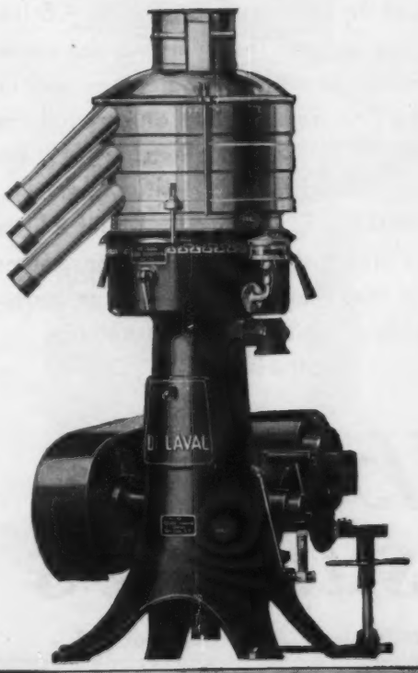
An Aladdin's Lamp for users of oil!

NO mere myth is this twentieth century magic. Press a button, and — presto! — dirt, metallic particles, water and other impurities, which greatly lower the lubricating or insulating efficiency of oil, are removed. The oil is ready to serve you again as when new.

The genie in this case is none other than the De Laval Oil Purifier. Its almost magical power in removing solid impurities and water from oil is attested by 91% of America's greatest electric power systems, which use it to maintain the efficiency of lubricating and insulating oils.

The De Laval Purifier has given the engineers of these companies and countless smaller ones a totally new conception of the service which oil may reasonably be expected to perform .... And because clean, dry oil serves so much better and is in every way more economical, few engineers of large plants now care to operate either prime movers or oil-immersed electrical equipment without a De Laval.

Write today for full details of the De Laval Oil Purifier best adapted to your needs, asking for Bulletin 106-E on lubricating oil, or 107-E on insulating oil.



THE DE LAVAL SEPARATOR COMPANY

165 Broadway, New York — 600 Jackson Blvd., Chicago
DE LAVAL PACIFIC COMPANY, 61 Beale Street, San Francisco
THE DE LAVAL COMPANY, Ltd., Peterborough and Winnipeg, Canada
ALFA-LAVAL CO., Ltd., 34 Grosvenor Road, London, S. W. 1.

DE LAVAL Centrifugal Systems

WHEN the SUN does DOWN

USUALLY, the working day for most equipment is made up of the hours between sunrise and sunset. In this respect THOMAS INSULATORS are unique. Their working day never ends. It commences with the time they are installed on the line and it goes on through the years. Some THOMAS installations, in fact, are now well along toward the half-century mark. . . . THOMAS INSULATORS may be built a little heavier and a little better than sometimes seems necessary but thus they at least insure an unusually long life of satisfactory performance on the line.

May we suggest that power company engineers feel perfectly free to call in a Thomas Field Service Engineer to aid in the solution of especially perplexing insulation problems. This service is gratuitously offered and its value should not be underestimated. Thomas Engineering Service is based on an excellent background of knowledge and experience dating back to 1873.

Thomas Insulators

An American Standard Since '73

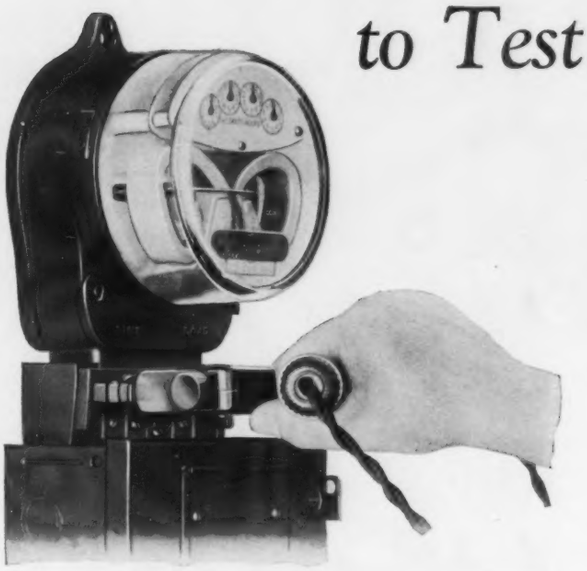
THE R. THOMAS & SONS CO.

LISBON, OHIO, U. S. A.

NEW YORK BOSTON CHICAGO LONDON

A BETTER WAY

to Test Type I-16 Watthour Meters



Test adapter, to be permanently installed with the meter

Service plug for disconnecting meter from circuit

Testing plug, which provides the connections for testing

ADVANTAGES

Testing is made safer and easier; there is a substantial saving of time.

The service box need not be opened to test the meter.

The consumer's load is uninterrupted during test.

The meter can be instantly "cut out" without disconnecting at the terminals.

THIS testing device can be used for watthour meters installed with service boxes, for watthour meters installed in protective cases, and for group installations.

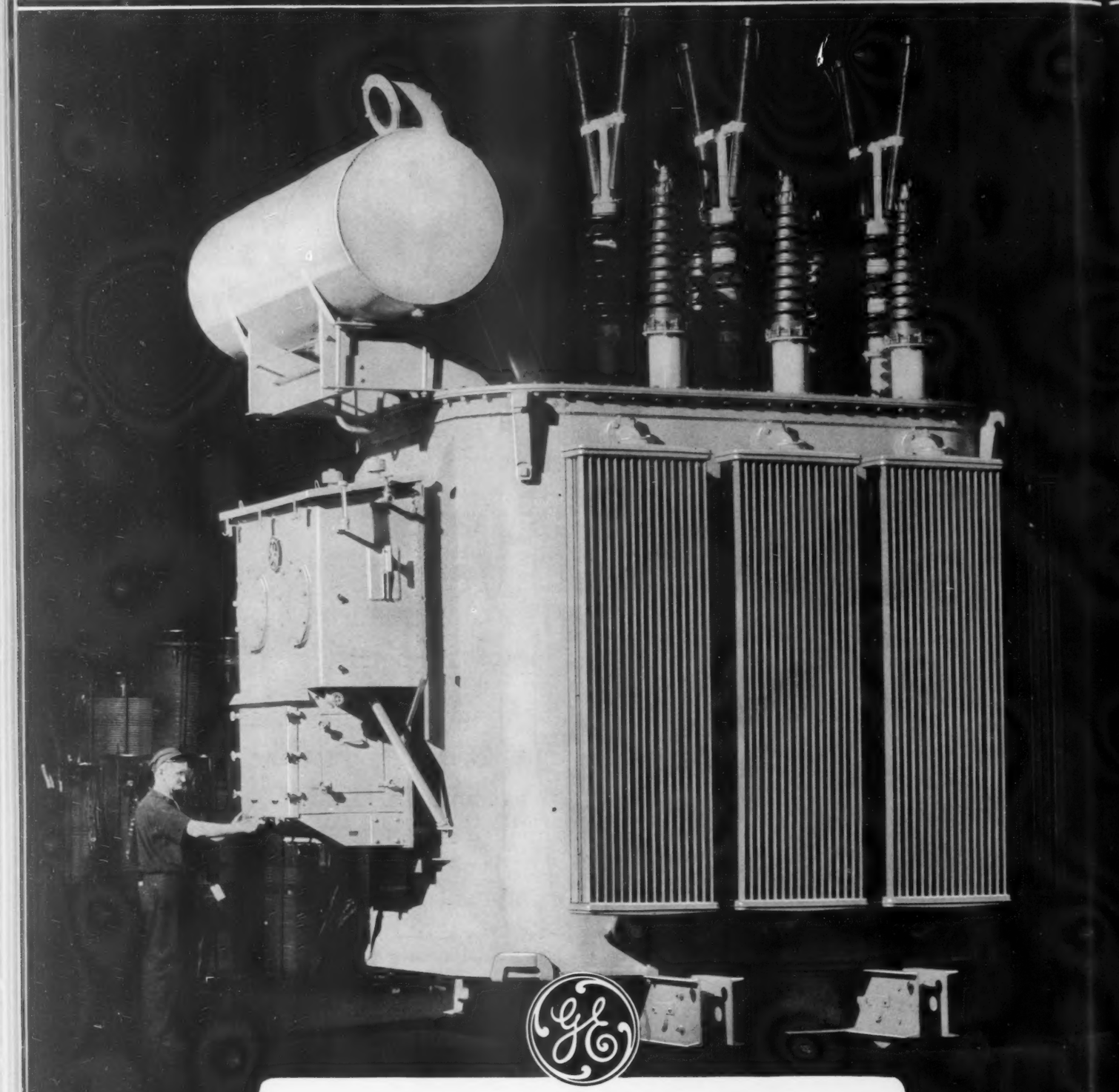
Completely described in Bulletin GEA-1329

600-30

GENERAL ELECTRIC

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

TO CONTROL VOLTAGE



THREE REGULATING TRANSFORMERS OF THIS TYPE BUILT FOR THE TEXAS POWER & LIGHT COMPANY SOLVED THE PROBLEM SET FORTH ON THE NEXT PAGE

THIS is a 66,000-volt, three-phase, regulating transformer. It controls (in eight equal steps) the voltage 20 per cent plus or minus, or the phase angle 11.3 degrees plus or minus, up to 10,000 kv-a. Up to 20,000 kv-a., it controls the voltage 10 per cent plus or minus, or the phase angle 5.7 degrees plus or minus.

AND PHASE ANGLE

PROBLEM

Two or more stations, with constant voltage held on their buses, are connected in a loop. It is desired:

1. ***To control the source of reactive kv-a. on the system***
2. ***To control the direction of power flow in the system***

SOLUTION

1. ***Control the reactive kv-a. by varying the voltages feeding the loop at different points.***
2. ***Control the power flow by shifting the phase angle in the loop.***

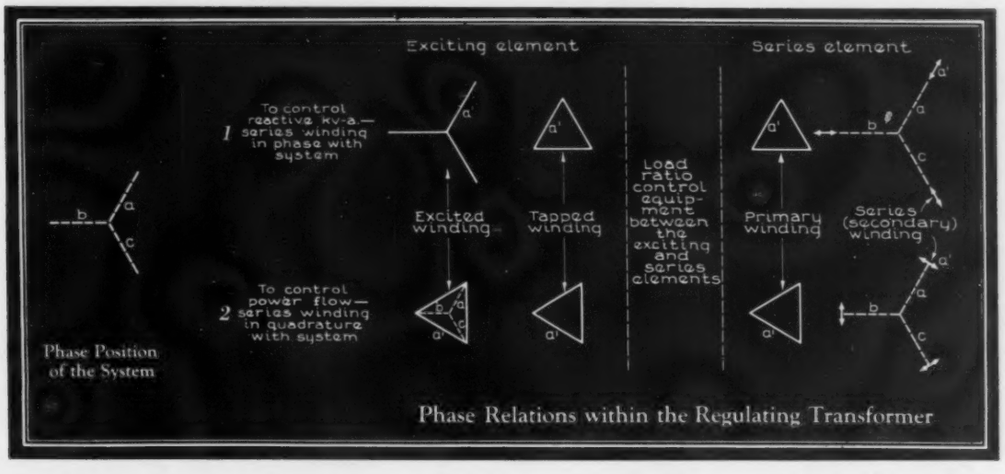
RESULTS

Economy in generation and transmission

Flexibility in operation

Well-regulated service

The solution of the problem was obtained by means of the regulating transformer illustrated, built with load ratio control equipment for changing taps under load, and designed to obtain voltage and phase relations as shown in the following diagram:


Exciting element
Series element
To control reactive kv-a.— 1 series winding in phase with system
Excited winding
Tapped winding
Load ratio control equipment between the exciting and series elements
Primary winding
Series (secondary) winding
To control power flow— 2 series winding in quadrature with system
Phase Position of the System

Phase Relations within the Regulating Transformer

The equipment, used to change the taps of this transformer while under load, is similar to those that have been applied to other G-E power and regulating transformers totaling many thousands of kv-a. It has the following distinctive features:

Simplest possible arrangement of taps that will give the desired ratio steps.

Uniform voltage steps regardless of load or power-factor.

No reactive load is added to the system on any tap position.

Durable construction, combined with neatness and compactness.

All tap voltages in each phase are obtained with only two interrupting contacts.

Specially designed contacts minimize upkeep and give long life to the arcing tips.

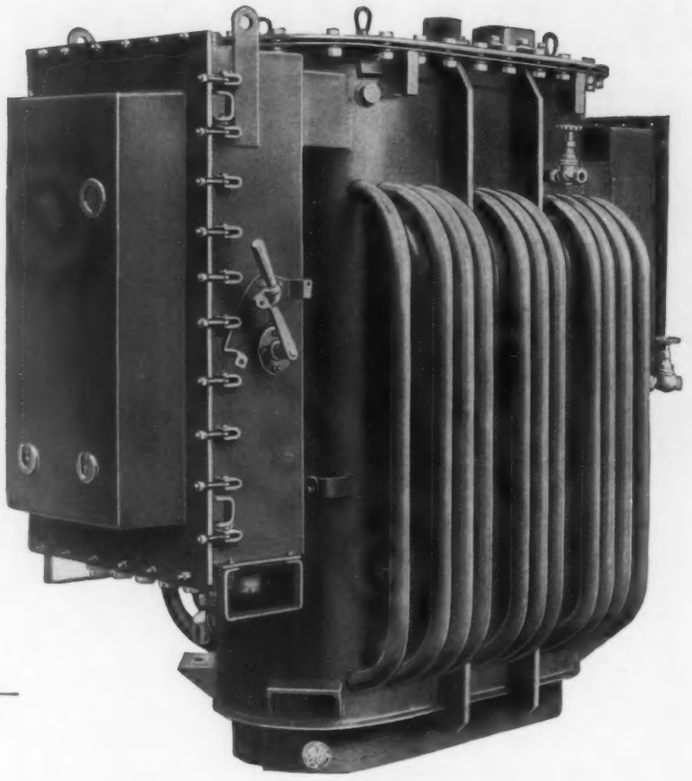
Complete oil immersion of all high-voltage parts and connections.

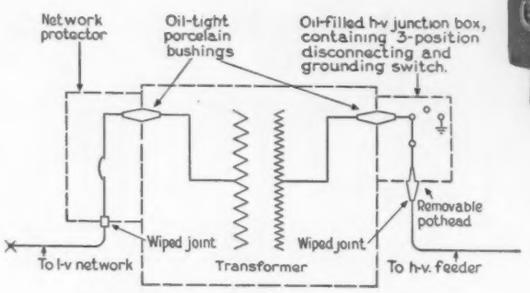
410-26

GENERAL ELECTRIC

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

To simplify a-c. network installations





Diagrammatic Connections of Combined Unit

A combined transformer and network protector

—affording the following advantages over individually mounted equipment:

Simplified installation
Lower installation cost
Reduced space requirements

The illustration and diagram show how the network protector and a three-phase transformer can be combined in one unit. The low-voltage network-protector case and the high-voltage junction box, containing the disconnecting and grounding switch, are removable.

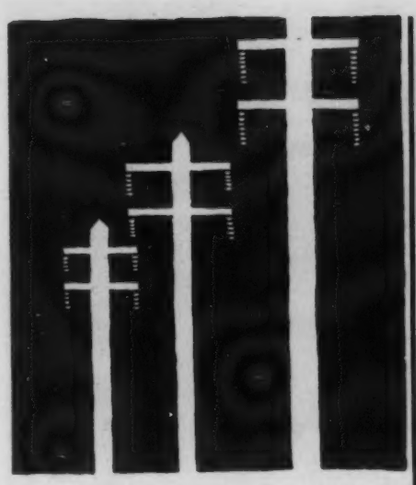
JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

Write for Bulletin GEA-1248, which describes the special features embodied in G-E transformers and network protectors for secondary a-c. network systems.

401-27

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES



12 POINT SUPERIORITY

1. Greatest strength per pound of structure
2. Long life
3. Reduced fire hazard
4. Protection from insects and decay
5. Greatest electrical insulation
6. Longer spans
7. All-over protection
8. Uniform strength
9. Low annual cost
10. Minimum maintenance
11. Good appearance
12. Unlimited supply by reliable producers

★

12 point Superiority provides:

Uniform Strength

Douglas Fir Poles grow in close stands. This results in few knots, uniform taper, exceptional straightness, and uniform strength.

Uniformly seasoned in the treating process, the maximum strength of these poles is available from the time they leave the retort.

Pressure creosote treatment, scientifically controlled throughout all the stages, maintains this uniformity and preserves it for many years of pole line service.

Engineering economy dictates

Pressure Creosoted DOUGLAS FIR *Poles*

IMMUNIZED AGAINST DECAY AND INSECTS

Producers

West Coast Wood Preserving Co.,
Seattle, Wash.

Chas. R. McCormick Lbr. Co.,
Portland, Ore.

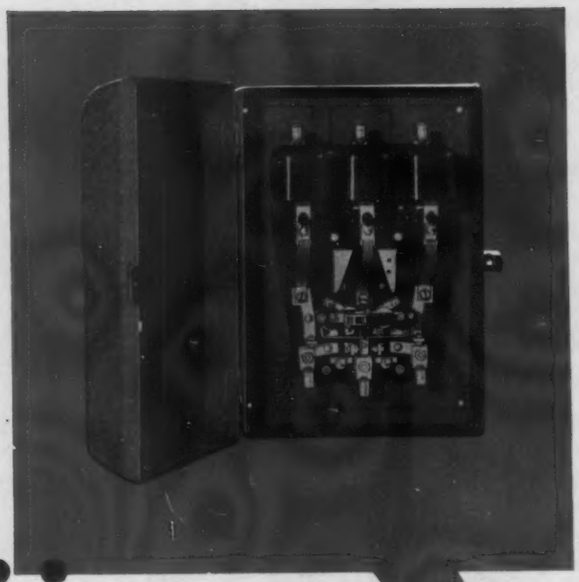
California Distributors

The Charles Nelson Co.,
San Francisco and Los Angeles

Chas. R. McCormick Lbr. Co.,
San Francisco and Los Angeles

ENGINEERING REPRESENTATIVES—Farnham & Cunningham, Los Angeles, Calif.

Frontal view of the K. Y. R. heavy duty magnetic switch. Note the compactness and accessibility of the panel, as well as the individual bakelite shields which are readily removable.



Assured CONTROL . . .

For the control of motors ranging from 7½ to 50 h.p. inclusive, Diamond E engineers have designed a convenient, compact, magnetic switch—sturdy, foolproof in construction and responsive under all conditions. All K. Y. R. magnetic switches afford positive overload protection consisting of two bi-metallic thermal elements independently responsive to the current flowing in two leads of the motor.

Three forms of type K. Y. R. series are available. Form B lever type control switch and relay reset combined built integral with the panel for local control or combined local or remote control. Form N with lever type relay reset only for remote control only and Form R with lever type control switch built integral with the panel for combined local hand control and remote automatic control. Stocked by all dealers and distributors.

DISTINCTIVE K. Y. R. FEATURES

Control manual or automatic or combination of both.

Thermal overload relay

Interchangeable thermal element.

Entire panel assembly easily removed.

Ample wiring space.

Concentric knockouts on four sides and back.

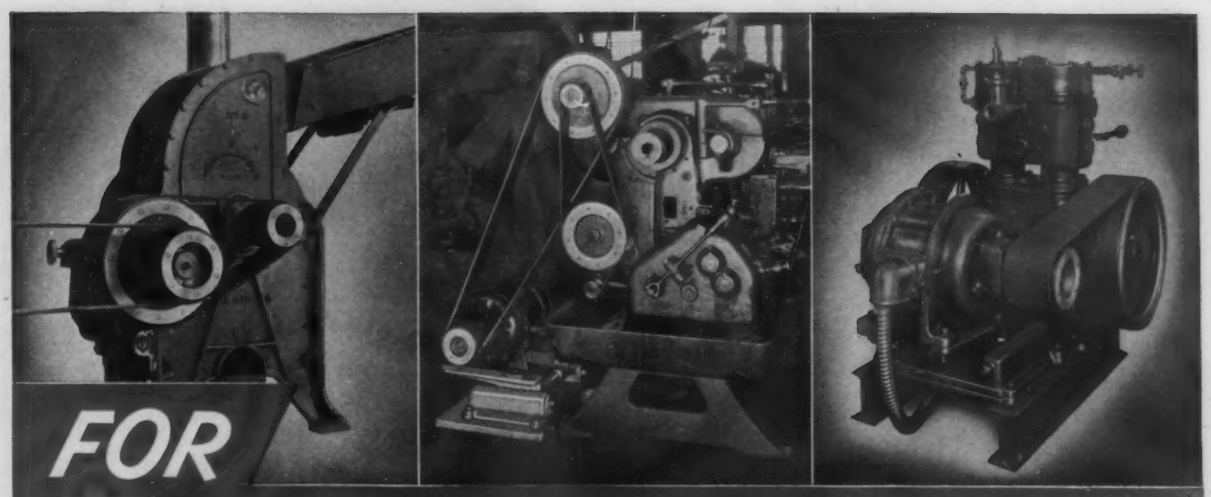
Blowout coils furnished for higher ratings.

DIAMOND ELECTRICAL MANUFACTURING COMPANY, LTD.

Affiliated with Square D Company

LOS ANGELES 1318-62 E. 16th St.

Thermal overload protection entirely at your finger tips means more efficiency from operators, more production from machines.



FOR

ECONOMICAL POWER DRIVES

– USE

ROCKWOOD

PULLEYS THAT PULL

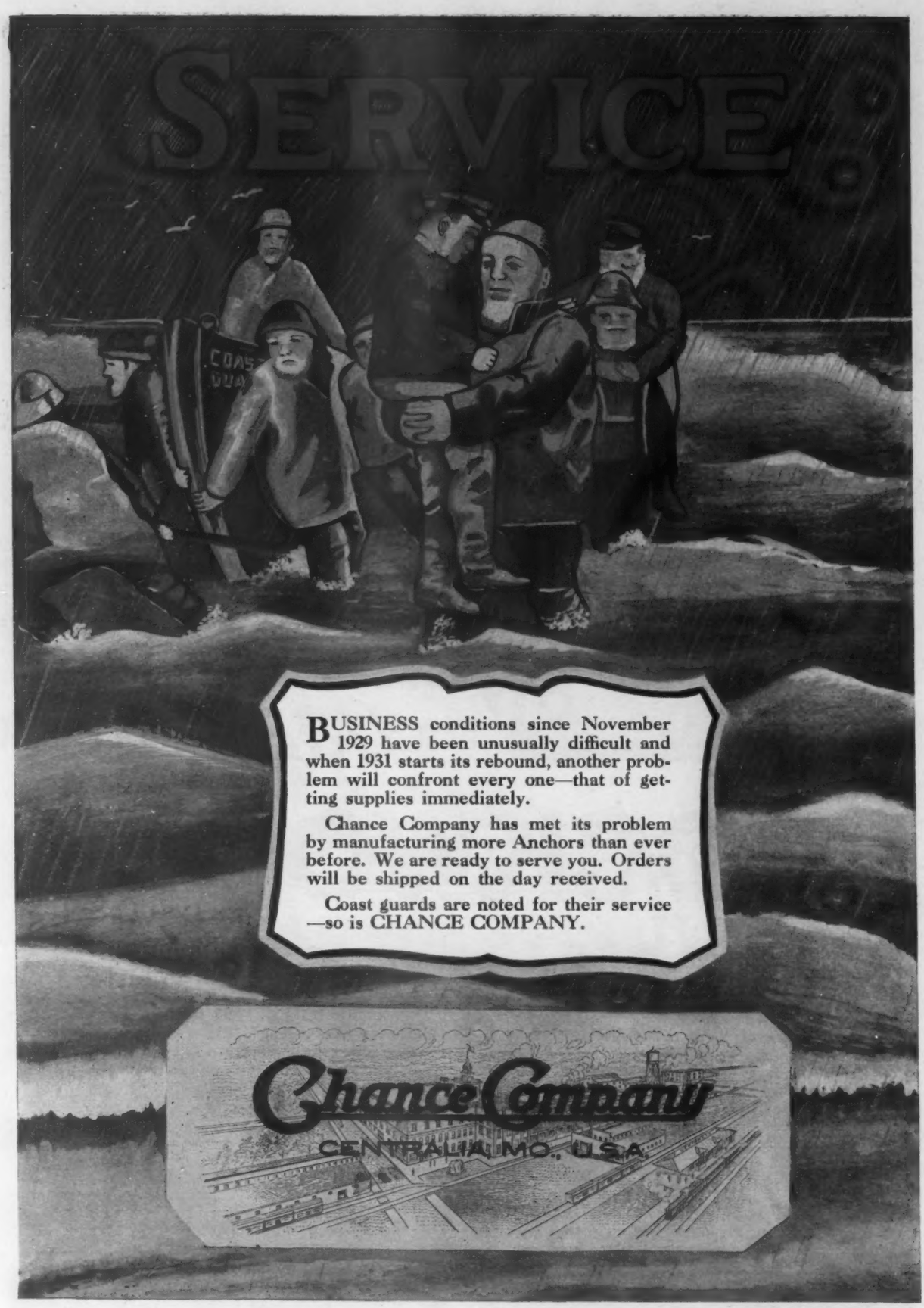
THERE'S NO NEED for "extravagance" in providing drives for your machines! Reliable tests have repeatedly shown that the flat belt drive (*when correctly designed and equipped*) has no equal in efficiency, dependability and economy! . . . It is lowest in first cost—easiest to install and maintain—absorbs shocks and prolongs the life of both driving and driven units, and is *highly efficient*— more so than any gear, chain or V-belt drive.

For greatest economy in flat belt drives, always use ROCKWOOD Pulleys! Their end-grain fibre surface has *twice* the pulling power of metal pulleys! By eliminating belt slip, ROCKWOOD Pulleys assure longer belt life! Test out their superiority on your hardest drives.

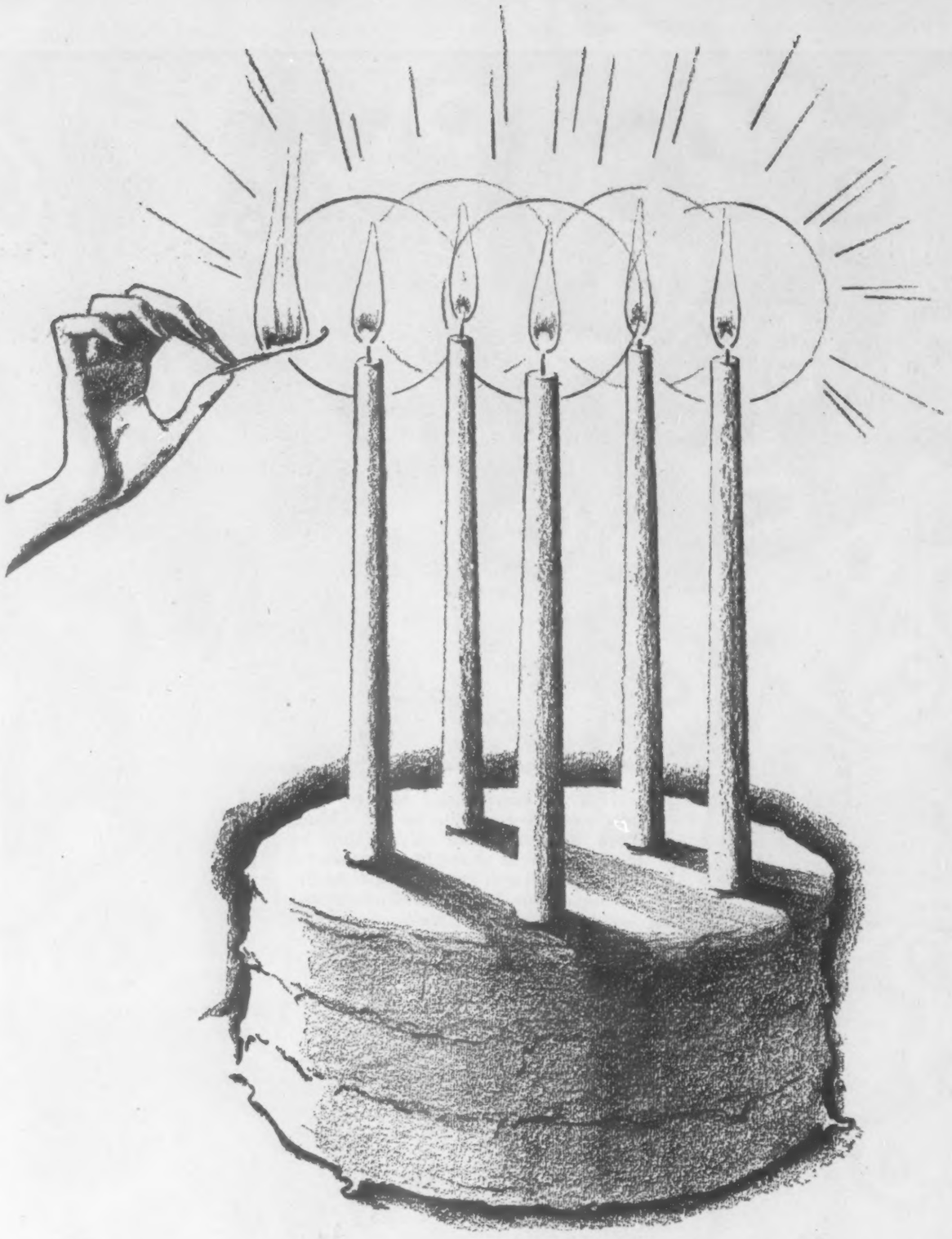
THE ROCKWOOD MFG. COMPANY, *Indianapolis, Ind.*
THE OHIO VALLEY PULLEY WORKS, *Maysville, Ky.*
Divisions of General Fibre Products, Inc.

THE BEST PULLEYS TO BUY...
...THE CHEAPEST PULLEYS TO USE

OVER 2,000 STOCK SIZES—IN ALL PRINCIPAL CITIES


SERVICE
BUSINESS conditions since November 1929 have been unusually difficult and when 1931 starts its rebound, another problem will confront every one—that of getting supplies immediately.
Chance Company has met its problem by manufacturing more Anchors than ever before. We are ready to serve you. Orders will be shipped on the day received.
Coast guards are noted for their service —so is CHANCE COMPANY.
Chance Company
CENTRALIA, MO., U.S.A.

FOR 1931
COMPANY service and service of its products go hand in hand. Chance Anchors have stood the test of time because of their great strength, ease of installation, big factors of safety, and long life. The Company along with its products give service under the most trying conditions.
We manufacture NEVER CREEP ANCHORS, COPPER ALLOY STEEL EXPANDING ANCHORS, CHANCE SCREW ANCHORS, CHANCE CONE ANCHORS, and many other pole line specialties.
Write for a catalog.
Chance Company
CENTRALIA, MO., U.S.A.



5 YEARS OLD
..62 YEARS IN BUSINESS

GraybaR

In 1869, Gray and Barton; in 1882, Western Electric Supply Department; since January 1, 1926, GRAYBAR

SAN FRANCISCO SEATTLE LOS ANGELES OAKLAND SPOKANE PORTLAND TACOMA

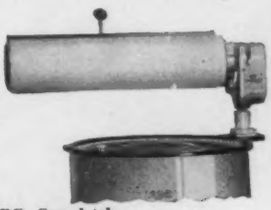
Start the NEW YEAR *Right!*

ABC

ABC Porcelain Electric Spinner; retails $175.00

ABC Playmayd, with B & S gas motor; retails $142.50

ABC Electrotable, (prepares food electrically) retails $250.00



ABC Completely Convertible Electric Ironer—Wringer Post, Portable, Rollabout models

In addition to the above the complete ABC line includes: ABC Companion; retails $149.50. ABC Companion with B & S gas motor; retails $179.50. ABC Playmayd, electric; retails $109.50. ABC Apartment, the Up-to-Use, Down-to-Tuck-Away Washer; retails $84.50.

Turn over a new leaf—to the profit page. Throw away the red ink. Make money every month in 1931—with this line that sells to the mass market, the quality market, the farm market—then re-sell these same markets with these wanted, acceptable, in-demand electrical appliances. Start the New Year right with

Minimum Investment—one line buying cuts down inventories, freight charges, all overhead.

Faster Turnover—knowing one line increases sales; ends competitive selling on the floor.

Less Service—all porcelain, plus precision manufacture; practically eliminates repossessions, replacement and service losses.

Effective Advertising—one line buying insures 100% co-operation—newspaper, direct mail, bill-board publicity.

Public Acceptance—gained through 22 years faithful service and publicity.

Larger Profits—all these advantages combined—smaller investments, faster turnover, less service, effective advertising and "selling what the public wants to buy" provides 1931's most profitable washing machine and appliance franchise.

Start the New Year right—write today for all details on the complete ABC line, made by Altorfer Bros. Company, Main Office and Home Factory, (Est. 1909) Peoria, Ill.

West Coast Branch: Chamber of Commerce Bldg., Los Angeles.

Complete warehouse stocks Los Angeles and Oakland

ALTORFER BROS. COMPANY,
Chamber of Commerce Bldg.,
Los Angeles, Calif.
Send dealer franchise facts on the industry's most profitable line

Name .....

Address .....

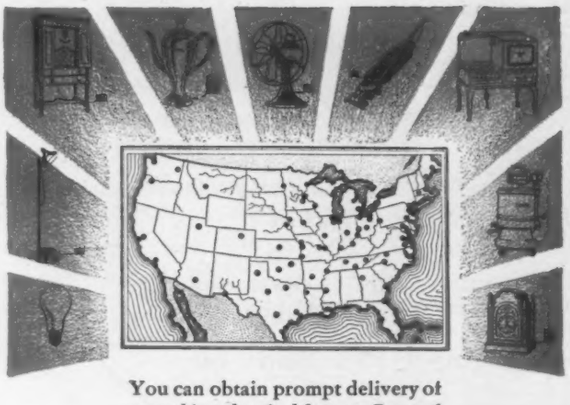
Town ..... State .....

"THE FASTEST SALE I EVER MADE"

"She came into the store and asked for a sunlamp. I could probably have sold her any one of several makes. When I showed her a General Electric Sunlamp she said, 'I'll take it!'"

You needn't waste a lot of time "explaining who made it," when you handle merchandise supplied by the General Electric Supply Corporation. Only nationally advertised products are offered. The names are household words—they win instant acceptance!

You save time in demonstrating and selling... you add to the prestige of your store...when you handle these well-known brands. You keep old customers and add new ones, as you utilize the sales-developing power of these nationally advertised products.

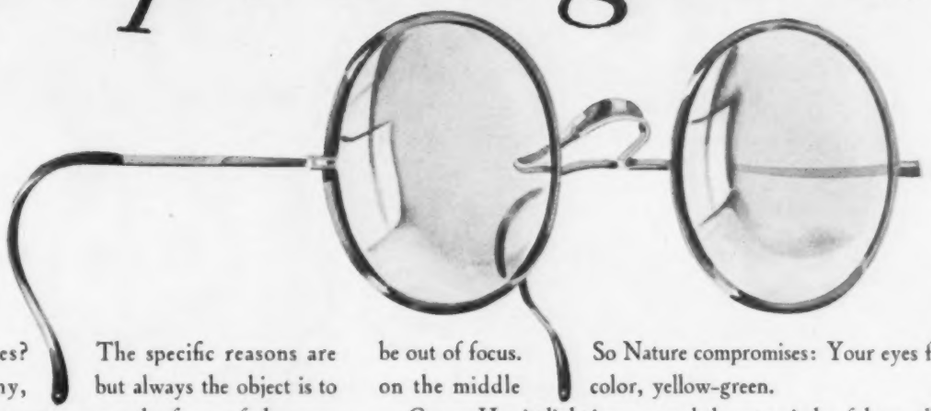


You can obtain prompt delivery of *everything electrical* from a General Electric Supply Corporation wholesale warehouse near your store.

GENERAL ELECTRIC

SUPPLY CORPORATION

Why *do people wear glasses?*

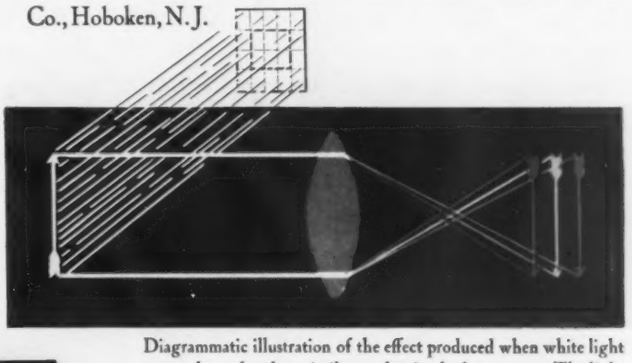


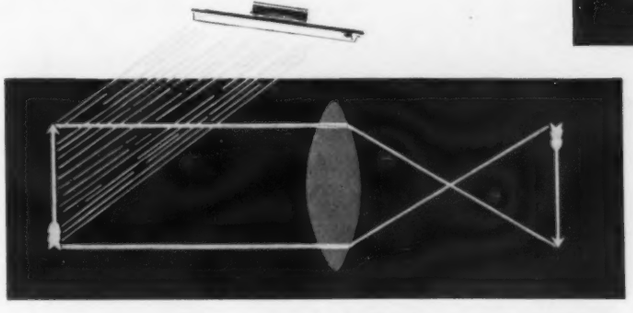
WHY wear glasses? The specific reasons are varied and many, but always the object is to improve impaired vision—to correct the focus of the eyes. Faulty focus, you know, makes objects appear hazy—blurs outlines and strains your eyes.

Weak eyes brought back to normal by the use of glasses, and even normal eyes without glasses, do not see objects as clearly as the construction of the eye permits. For there is a *natural* faulty focus of wholly *normal* eyes, which is caused by the complex mixture of colored rays that compose daylight or "white" light.

Your eyes are unable to bring all these colors in white light to the same plane of focus in the eye. Should your eyes focus on a color at one end of the spectrum, say red or orange, the colors at the other end, blue and violet, would be out of focus. So Nature compromises: Your eyes focus on the middle color, yellow-green.

Cooper Hewitt light is composed almost entirely of these yellow-green rays—That's why all objects under Cooper Hewitt light are seen clearly and sharply without eye-strain. Have you read "Why Cooper Hewitt light is better than daylight?" A copy of this booklet is yours for the asking. General Electric Vapor Lamp Co., Hoboken, N.J.





Diagrammatic illustration of the effect produced when white light passes through a lens similar to that in the human eye. The light is split into its various colors, only one of which can be focused sharply. The other colors, being slightly out of focus, tend to make the image hazy.

When Cooper Hewitt light, which is 90% yellow-green, passes through a lens similar to that in the eye, the image produced is sharp and clear, for the effect is practically that of a single color, and that the best-seeing color and the easiest on the eyes.

Join us in the General Electric Hour, broadcast every Saturday evening on a nation-wide N. B. C. network

GENERAL ELECTRIC
VAPOR LAMP COMPANY

(See next page)

where WOULD *you go to thread a needle?*

In an exaggerated circumstance—say, when you thread a needle—you recognize instantly the importance of both the adequacy and the direction of light. And just so does light play its part in your industrial plant.

. — .

Poor lighting annually exacts a tremendous toll from American industry. It is responsible for a high percentage of the "seconds" turned out in every plant. It is the direct cause of innumerable mistakes all along the production line, wasting materials, wasting time, wasting profits.

. — .

Exact figures on the number and value of rejects, seconds and other losses caused directly and indirectly by inadequate and improper lighting are, of course, most difficult to obtain. But this much can be said:

. — .

Only 15 per cent of America's industrial plants are adequately and properly lighted. In these, accidents are comparatively few, seconds run low and production is high.

. — .

Only 29 per cent can be said to be "fairly well lighted." In these, accidents are more common, the percentage of seconds runs higher and production is lower.

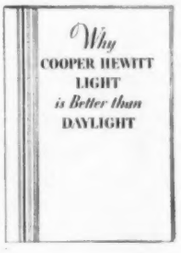
. — .

BETTER THAN DAYLIGHT

The remaining 56 per cent of all industrial plants are classed as poorly lighted. And in these, investigation has shown, the accident rate is high, the percentage of seconds is high and production is lowest.

. — .

Cooper Hewitt mercury-vapor light, as some thirty different industries in America have discovered, is *the* light that "gets the industrial needle threaded." Some reasons why it helps reduce waste to a minimum, improves quality, and increases efficiency and profits generally, are given on the opposite side of this page. Many of the reasons are simply explained in the new illustrated booklet, "Why Cooper Hewitt Light is Better than Daylight." Free for the asking. Address: General Electric Vapor Lamp Co., 809 Adams St., Hoboken, N. J.



JOIN US in the General Electric Hour broadcast every Saturday evening on a nation-wide N. B. C. network

GENERAL ELECTRIC
VAPOR LAMP COMPANY

(*See preceding page*)

419 G. E. V. L. Co. 1930

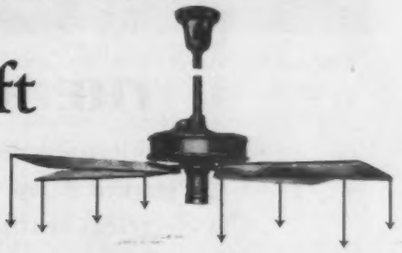
New

$6.50 List

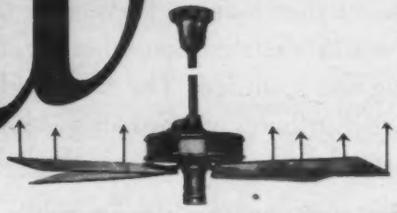
Seabreeze Fan

A new sales builder for you. 8-inch induction type. Non-oscillator. Beautiful beige (gray ivory) color. Sturdy, light weight. Guaranteed one year. Made by the makers of Emerson Fans. Just what you need to build a bigger business on small fans.

New



Updraft



Downdraft

Reversible Ceiling Fan

A new Emerson Ceiling Fan. Changes breeze direction by changing the direction of rotation of the motor. Reversible, electrically—not mechanically. Nothing to loosen up, get wobbly and produce vibration. A big new selling point for Emerson dealers.

See new 1931 catalog for details of new 10-inch DC non-oscillating Fan and the New Emerson B Jr. Line, and other important changes.

Made by the makers of

THE EMERSON ELECTRIC MANUFACTURING COMPANY
2018 Washington Avenue, Saint Louis
806 W. Washington Blvd., Chicago — 155 Sixth Avenue, New York City

EMERSON FANS

with the 5 Year Guarantee

~ Fan-Circulated Warmth . . . Quick! ~

THE HOFFMAN THERMADOR

THE introduction of the Hoffman Thermador to the electrical industry marked a new era in electrical house heating, because a new principal in electrical heating was sounded. The fan rapidly draws in the cold air from the floor and re-distributes warmed air quickly and gently throughout the lower strata of the room atmosphere . . . the living zone!

The Thermador offers new opportunities for public acceptance of electricity for auxiliary heating purposes. In localities where the climate is mild, complete heating with the Thermador is being successfully used in residences, hospitals, apartment houses and other types of buildings.

WALL TYPE

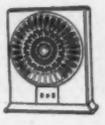
This new wall-type Thermador is installed directly in the wall, the frame fitting flush with the wall. Made in three sizes—2 Kw., 3 Kw., and 4 Kw.—are designed to fit between the studs of a standard wall.

TABLE TYPE

The table type Thermador combines with the heater an attractive occasional table which may be easily moved from room to room. It is compact, gracefully proportioned and handsomely finished. A safe and efficient heating device.

A Number of Models to Meet Various Heating Requirements

PORTABLE



The portable Thermador is equipped with a recessed handle in back and foot-base so that it may be placed wherever desired. Its use as an auxiliary heater in the sick room, the nursery, the recreation room and other parts of the home cannot be over estimated.

BATHROOM

The Thermador for installation in bathrooms is obtainable in two styles—fan operated or radiant-glow. Regardless of how other rooms in the house are heated, the Thermador offers the easiest and most economical method of heating the bathroom.

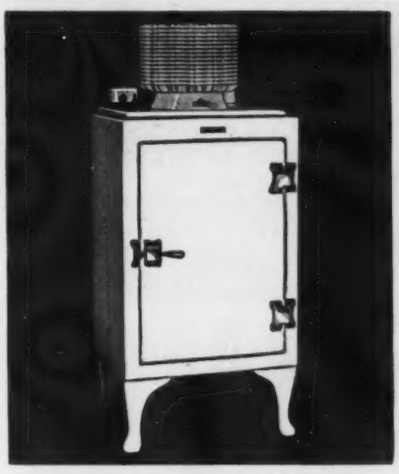
Send for booklet "A Seven League Step in the Science of Electrical Heating"

HOFFMAN SPECIALTY COMPANY
OF CALIFORNIA, LTD.
816 West Fifth Street . . . Los Angeles, California
557 Market Street . . . San Francisco, California

Originators of the Electrical Heater with the Fan

Make sure of this year's LOAD INCREASE

Bigger—stronger—still more impressive—the 1931 General Electric Refrigerator advertising campaign is a selling force matched only by the chorus of owner approval.



SURELY one of the best ways to get this year's load increase is to sell the refrigerator that makes homes and stores "sure of this year's savings." But even the nicely distributed, 24-hour, all-year load is not the only asset represented by all the General Electric Refrigerators that go on the line. They are not only super-salesmen of central station service; they are generators of great good will.

That's inherent in the extreme economy and freedom from attention made possible by the General Electric Monitor Top—hermetically sealed-in-steel—dirt-proof—moisture-proof—tinker-proof—self-oiled—lastingly quiet—a source of pride in the home, a source of business in stores, because of the distinctive modern style that says "General Electric".

The performance record made possible by the Monitor Top is on the tongues of America. It is "sending them in" to be sold. It is piling up consumer gratitude for all those connected with the sale of General Electric Refrigerators. For more K W H, for more good will, for more profit *that sticks,* talk General Electric Monitor Top in 1931.

Electric Refrigeration Department, Section DC1, General Electric Co., Hanna Bldg., 1400 Euclid Avenue, Cleveland, Ohio.

GENERAL ELECTRIC

COMMERCIAL REFRIGERATORS

THE Standard ELECTRIC STOVE Co.

MANUFACTURERS OF
DOMESTIC RANGES, HOTEL & RESTAURANT HEAVY DUTY RANGES
FIRELESS COOKERS, WATER HEATERS, COFFEE URNS, HOT PLATES, GRIDDLES

1718-1720 NORTH TWELFTH STREET
TOLEDO, OHIO, U.S.A.

To Electrical Merchandisers
in the Western States

In 1931, the cards will be dealt in your favor--more than ever before. The retailer of electrical merchandise is coming into his own.

The western States are a particularly fertile field for electric range sales. Now you can cultivate this field under the most favorable conditions--especially if you operate with a line of high-grade ranges that offers complete coverage of electrical cooking requirements. Standard is such a line. It includes ranges of every size, for every purpose. It is a quality line. Standards have always been ready sellers because they are worth the money.

* * * *

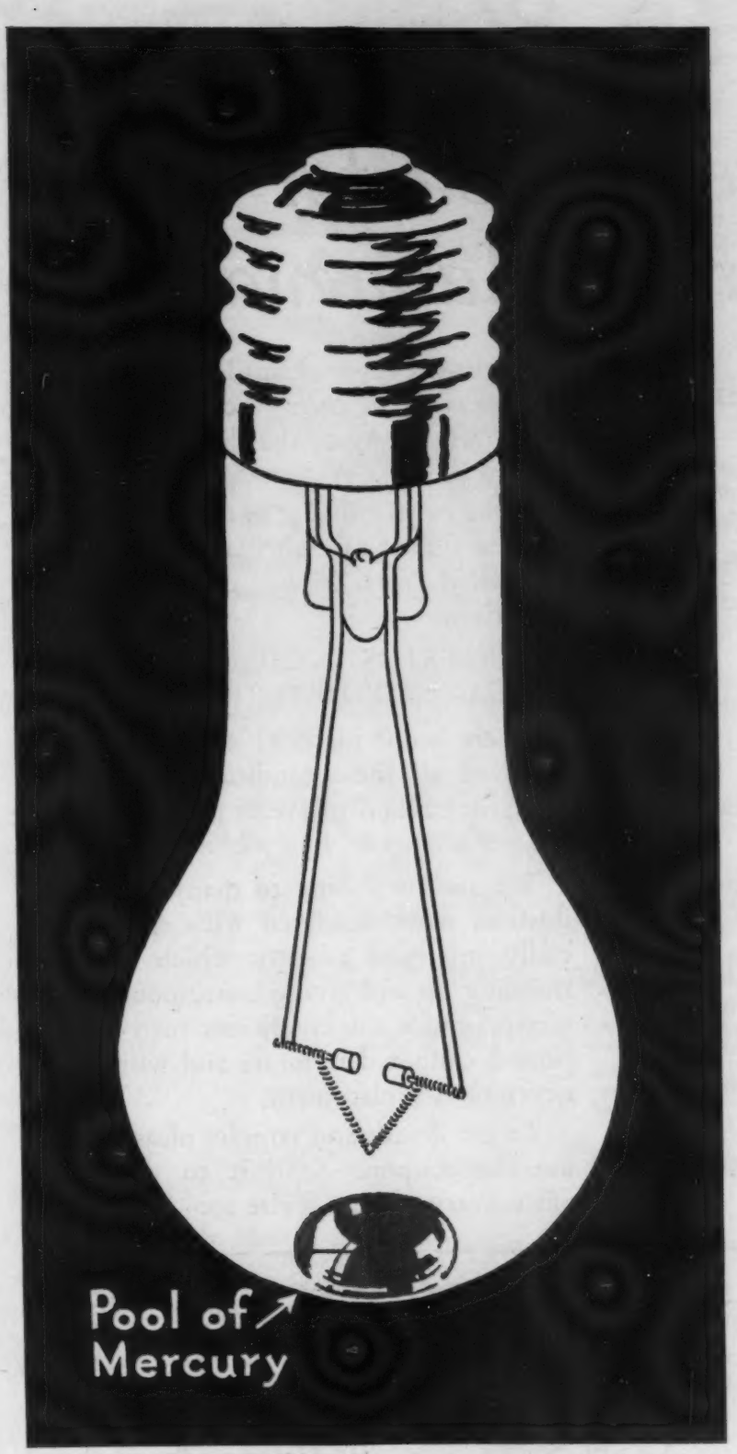
Standard has a dealer cooperative plan, with stocks available at convenient points.

We are proud of our Standard dealers. We want more like them--dealers who are ethical and reliable. Dealers who are alert to the range opportunities that the new era of electrical merchandising affords.

If you wish to expand your sales in the greatest profit and load builder ever placed on the market, write us at the address above--or get in touch with Listenwalter and Gough, Standard jobbers in Los Angeles and San Francisco, or with Wm. P. Swartz, 629 South Serranno Avenue, Los Angeles, our representative on the Pacific Coast.

Yours truly,

The Standard Electric Stove Co.



GENERAL ELECTRIC
SUNLIGHT MAZDA LAMP

General Electric Sunlight MAZDA lamp advertising will reach over 35,000,000 key buyers during January, February and March. It also reaches 122,000 of their medical advisors every month.

Over 7,500 inquiries from potential buyers have already been received. Hundreds more are coming in daily.

These facts will undoubtedly suggest to you that if you are not capitalizing on this tremendous public interest, you should be. Investigate—and act—now.

The story of the G. E. Sunlight MAZDA Lamp and the market for it, together with many proven, practical sales ideas, is contained in an interesting new booklet, "Selling Sunlamps." A copy is waiting for you. Write for it or send the coupon and it will come to you promptly.

Ultra-violet rays are invisible. This Ultra-Violet Indicator will enable you to let your customers SEE the presence of ultra-violet. It may be purchased, as illustrated, from Nela Park, for $3.00.
Another valuable selling help is "Artificial Sunlight" by M. Luckeish, D. Sc. This book will give you an excellent background for selling the Sunlight MAZDA lamp. Copies may be secured from D. Van Nostrand Co., Inc., New York, at $3.50 each.

INCANDESCENT LAMP DEPARTMENT OF GENERAL ELECTRIC CO., NELA PARK, CLEVELAND, OHIO

Please send me, without charge or obligation, a copy of "Selling Sunlamps."

*Name*_____

*Address*_____

*City*_____ *State*_____

EW. 1-31

Join us in the General Electric Program, broadcast every Saturday evening on a Nation-wide N. B. C. Network.

To those responsible for Electrical Maintenance

A non-deteriorating wire

IF you are having trouble with wire failure either in plant or product due to

HEAT
OILS OR GREASE
ACID FUMES OR VAPORS
GASES OR
FIRE HAZARD

you can avoid such troubles in the future by using a wire insulated with a material which will not deteriorate by exposure to any of the above conditions. To find out how —at no obligation to yourself— use coupon below.

Ordinary types of insulated wire are all right in their place, which is *not* where any of the above conditions prevail.

Heat ruins rubber, so do oils or grease. Fumes eat fabric coverings and acid rots many insulating materials.

ROCKBESTOS INSULATION CANNOT DETERIORATE.

There is one material which has survived all these conditions *plus time* for millions of years and still has not changed. It is asbestos.

We are furnishing to many industries wires insulated with specially processed asbestos which is standing up and giving continuous service under the conditions mentioned, cannot deteriorate and will never need replacement.

To get details and samples please use the coupon. Send it to the office nearest you. Write to:-

ROCKBESTOS PRODUCTS
CORPORATION

(Send this coupon to office nearest you)

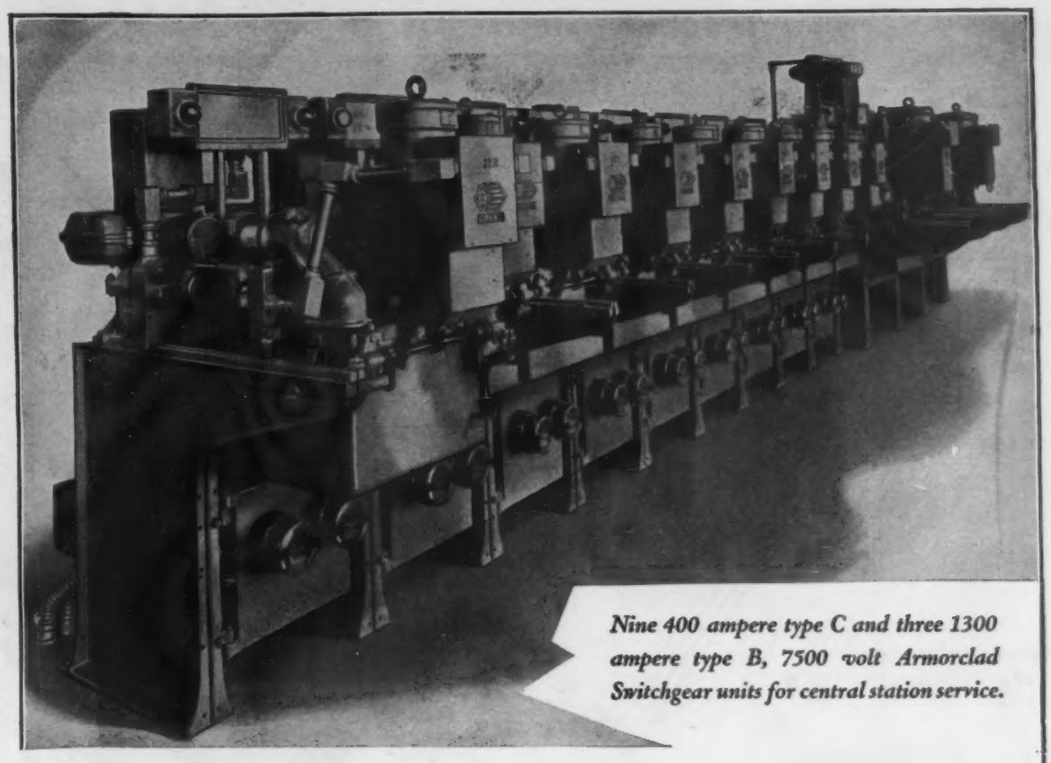
SAN FRANCISCO	SEATTLE	LOS ANGELES
360 9TH STREET	914 1ST AVENUE SOUTH	430 COLYTON STREET

Please send me copy of Bulletin No. 10 describing these non-deteriorating insulated wires.

NAME..... TITLE.....

COMPANY.....

ADDRESS..... CITY..... STATE.....



Nine 400 ampere type C and three 1300 ampere type B, 7500 volt Armorclad Switchgear units for central station service.

Armorclad Switchgear

— combines into one metal encased, compound filled, factory built and assembled unit, all of the necessary apparatus to make a complete three phase oil circuit breaker installation.

The Armorclad principle was developed over twenty years ago by A. Reyrolle & Co. Ltd., of Hebburn-on-Tyne, England. Today they are the largest manufacturers of metal-clad oil circuit breaker equipment in the world. Allis-Chalmers introduced Armorclad Switchgear into the United States.

Allis-Chalmers will be glad to figure on your oil circuit breaker equipment.

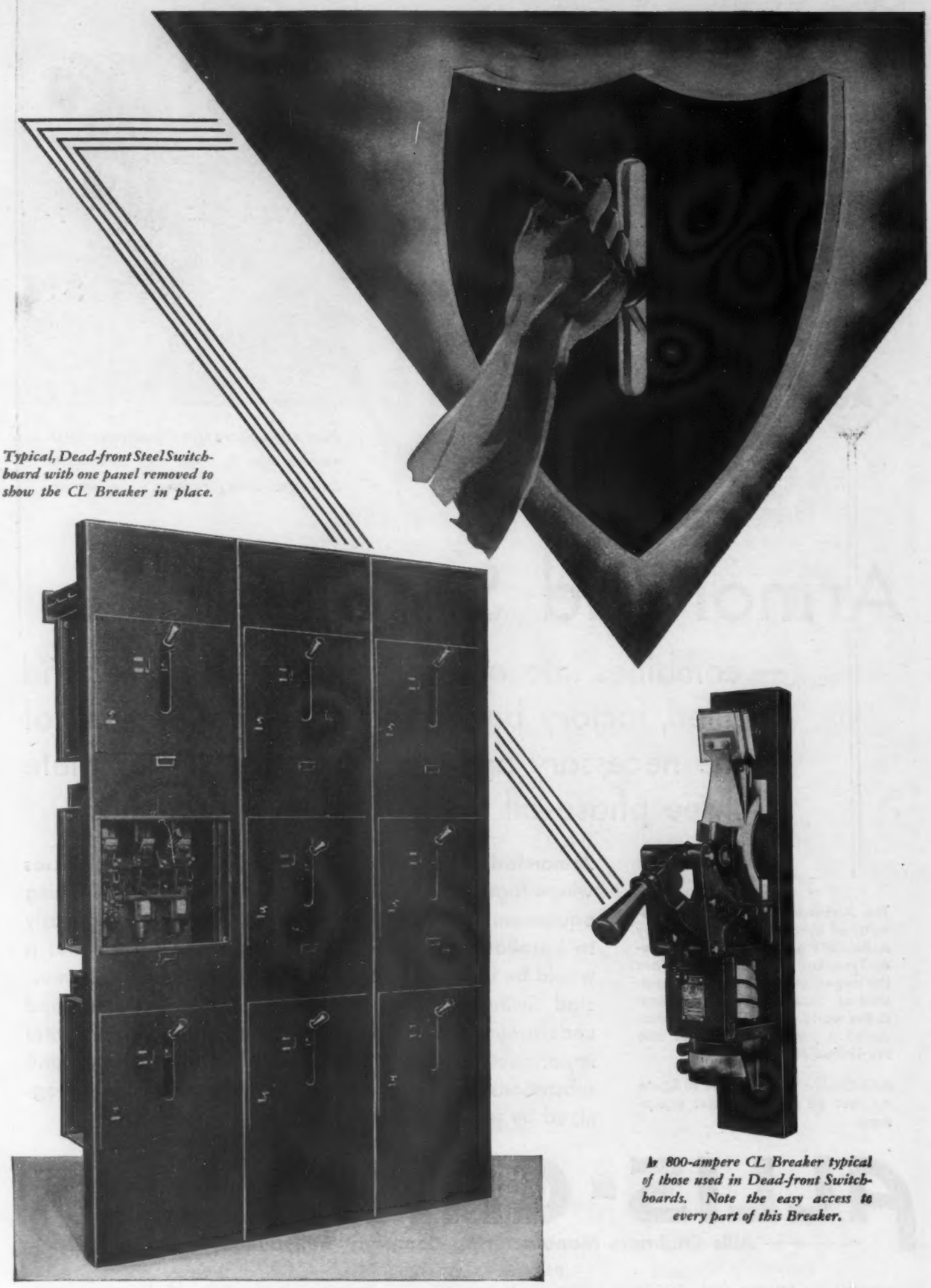
Armorclad Switchgear is adaptable to practically all cases where formerly other types of alternating current switching equipments were used. It has lent itself advantageously to installations where space limitations are such that it would be impossible to use another type. Primarily Armorclad Switchgear was developed for use in mines and underground work where space and safety was of vital importance. Its use then spread to power houses and substations. Now its advantages are becoming recognized by practically all users of electric power.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

PACIFIC COAST OFFICES:

Rialto Building, San Francisco, Calif. 1117 Rowan Building, Los Angeles, Calif. 1623 Smith Tower, Seattle, Wash. 505 Lumbermen's Building, Portland, Ore. 222 Continental Oil Building, Denver, Colo. 915 Kearns Building, Salt Lake City, Utah.



Typical, Dead-front Steel Switchboard with one panel removed to show the CL Breaker in place.

An 800-ampere CL Breaker typical of those used in Dead-front Switchboards. Note the easy access to every part of this Breaker.

A SHIELD OF STEEL *guards forgetful fingers*

THE forgetful fingers of operators and visitors are guarded from all live apparatus by a shield of steel in the new Westinghouse carbon breaker-equipped dead-front switchboards.

Only the insulated operating handles of CL carbon circuit breakers and the trip button project from the board. The breakers themselves are flush-mounted and are accessible through an opening in the front of the panel. This opening is covered by a removable steel plate . . . preventing unauthorized persons from tampering with the breaker mechanism. Yet, by removing four screws, inspections or adjustments to the breaker can be made while in the "on" position . . . without interrupting the service.

As an additional safety precaution, these switchboards can be made dead-rear as well as dead-front. And factory assembled and factory tested, Westinghouse dead-front switchboards cut installation time and labor to the minimum.

Circular 1705-C contains a description of dead-front switchboards and complete information on CL breakers. Request a copy of this booklet from our nearest office and additional information on applications of dead-front switchboards.

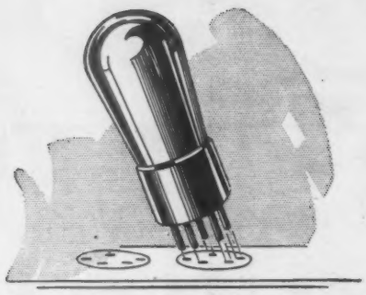
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31551

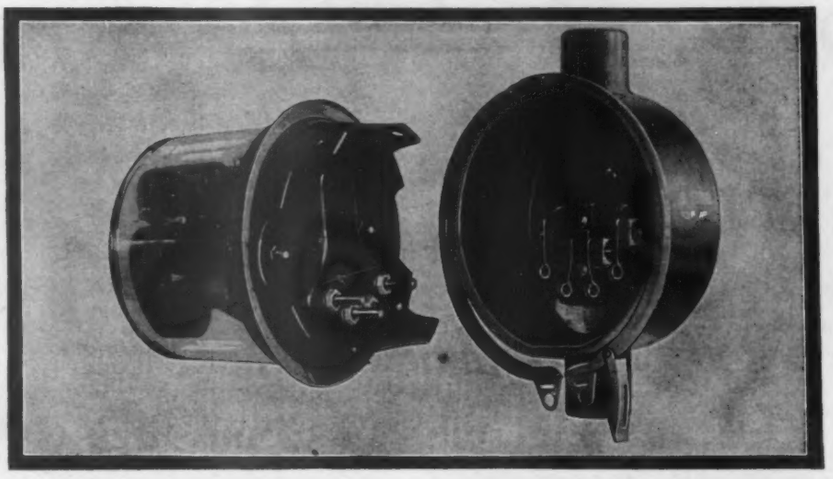
TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

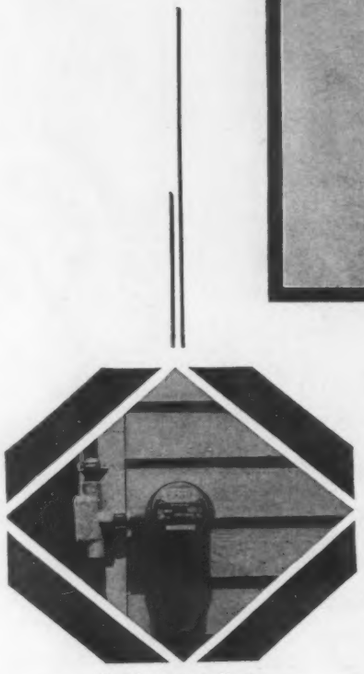
Butte, 52 East Broadway
Denver, 910 Fifteenth St.
El Paso, Mills Bldg.
Emeryville, 1466 Powell St.
Los Angeles, 420 South San Pedro St.
Portland, 901-2-3 Porter Bldg.
Phoenix, Ariz., 412 Luhrs Bldg.
Sacramento, 1100 Ninth St.
Salt Lake City, 10 West First South St.
San Diego, 803 Sixth St.
Seattle, Lloyd Bldg., 603 Stewart St.
San Francisco, 1 Montgomery St.
Spokane, 1322-23 Old National Bank Bldg.
Tacoma, 1021 Pacific Ave.
Wilmington, 303 Avalon Blvd.



Plug it in - Pull it out

—like a radio tube





Outdoor Installation

THE Detachable Meter saves time and money in installing, removing, and testing because it is installed and removed like a radio tube.

To install, merely plug it into place in its outer base.

To remove, simply pull it out of the outer base.

When testing, a small, easily-carried test jack facilitates testing on the premises. Also, this test jack eliminates any necessity or investment for permanent testing facilities. It makes testing a matter of minutes.

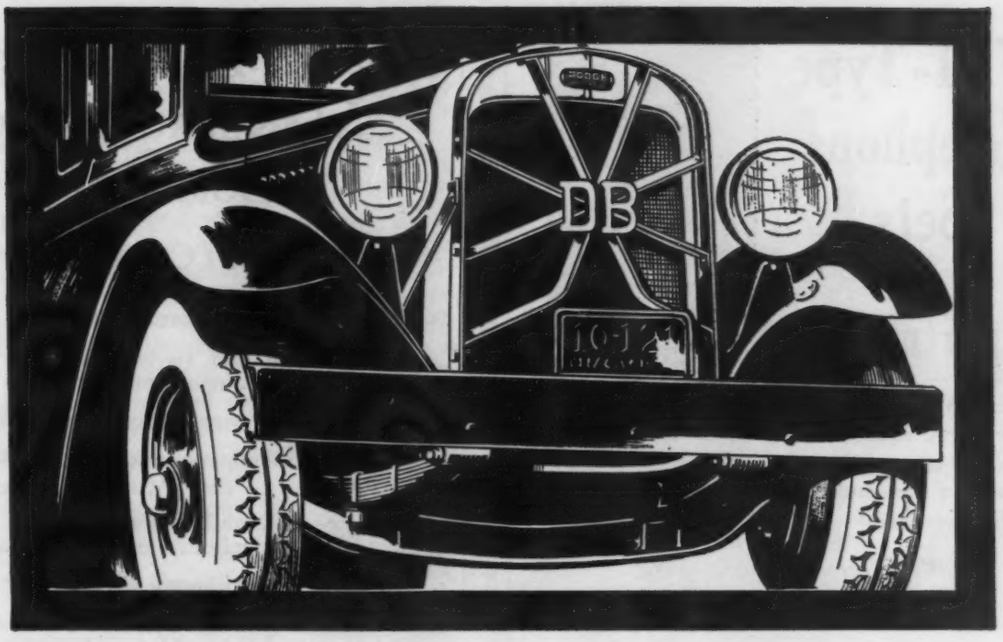
For complete information about this detachable meter, write our sales office near you. Our Meter Specialist there, also, is at your service.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31574

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.



SEE THE COMPLETE HEAVY DUTY LINE

For the heavy duty needs of Public Utilities, there is now an unusually complete line of Dodge Trucks—ranging in payload capacities from 2,950 to 11,175 pounds. They are heavy duty trucks through and through . . . with exceptionally powerful, dependable, economical engines . . . truck-type clutches . . . sturdy 4-speed transmissions . . . deep, rugged frames . . . drive shafts, springs, internal hydraulic 4-wheel brakes and full-floating rear axles (including double reduction) that are brutes for heavy duty work and look the part.

▪ ▪ ▪

Inspect, drive and compare these modern heavy duty Dodge Trucks. You will say that they are "all-truck"—that they look able, perform ably and are unusual values on any basis of comparison.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED, CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING 1½-TON CHASSIS AT $595

DEPENDABLE DODGE HEAVY DUTY TRUCKS

Wall-Type Telephone Sets *for* Apartments

Flush Mounted Type is available with either an outlet frame for non-conduit work or with outlet box for conduit work. All mechanism readily accessible by removing front plate.

Write for Bulletin No. 89.

S. H. COUCH Company, Inc.
Norfolk Downs, Mass.

RUNZEL-LENZ ELECTRIC MANUFACTURING COMPANY

CHICAGO

MANUFACTURERS OF

Telephone and switchboard cords—Central office operators cords

Radio and wireless cords—*Cables*

Tinsel and copper conductor cords all kinds

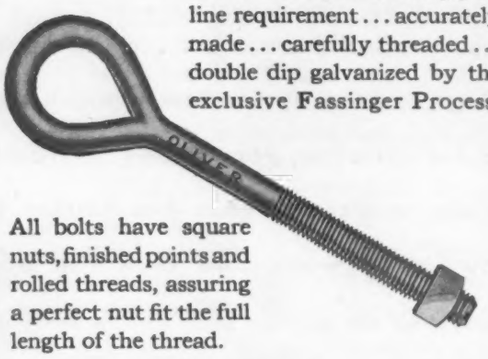
Wire—Silk and cotton insulated for wiring telephones and switchboards

Flame proof jumper wire

Cables—Silk and cotton insulated both braided and lead covered types

OLIVER BOLTS

A size and style for every pole line requirement... accurately made... carefully threaded... double dip galvanized by the exclusive Fassinger Process.

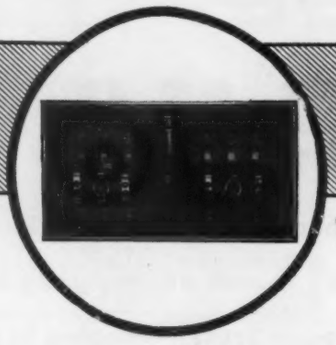


All bolts have square nuts, finished points and rolled threads, assuring a perfect nut fit the full length of the thread.

OLIVER POLE LINE MATERIALS

APPROVED AND ACCEPTED SINCE 1894

OLIVER IRON AND STEEL CORPORATION—PITTSBURGH



Type "G"

REMOTE CONTROL
The New Electric Switch

The modern way to light or extinguish many lighting circuits is to include "Diamond H" Remote Control Switches in the circuits.

They are economical and dependable.

Type G is a double throw Remote Control Switch with Relay.

It automatically throws from main circuit to emergency and back again. The lighting circuits of every theatre and hospital operating room should be controlled by this switch.

DIAMOND H SWITCHES

The Hart Mfg. Co., Hartford, Conn.

Distributor for above Manufacturers

Sierra Equipment Corporation

Telephone and Signal Engineering and Equipment

LOS ANGELES • SAN FRANCISCO • SEATTLE

Automatic Electric Inc.

CHICAGO, ILLINOIS

Engineers, Designers and Manufacturers of

STROWGER P-A-X. A private automatic telephone system providing complete intercommunicating service to those businesses and industries whose needs range from a half dozen or less telephones to those requiring several hundred.

STROWGER TELE-CHEC SYSTEMS. An usher signalling and control system (dial operated) for theaters.

STROWGER FIRE ALARM SYSTEMS. Complete fire alarm equipment, including detecting, signalling and registering apparatus incorporating exclusive automatic means which insure positive and unfailing operation under all conditions.

Also, Code Call Systems (Audible and Visual), Watchmen's Supervisory Systems, Marine Telephone and Signalling Systems and Miscellaneous Telephone and Signal Accessories.

Complete Telephone Systems

American Electric Company, Inc. manufactures and distributes everything necessary for public and private telephone systems. This equipment includes:

Switching Apparatus

Main Exchange Switchboards — Private Branch Switchboards — Power Plants — Distributing Frames—Arrester Equipment and Interior Cabling.

Station Equipment

Central Battery Telephones—Local Battery Telephones — Intercommunicating Telephones and Auxiliary Equipment.

Outside Equipment

Poles—Cable — Crossarms — Line Wire—Drop Wire—Strand—Construction Materials — Tools — Supplies — everything for either overhead or underground construction.

Complete Information and Prices Upon Request

American Electric Company, Inc.

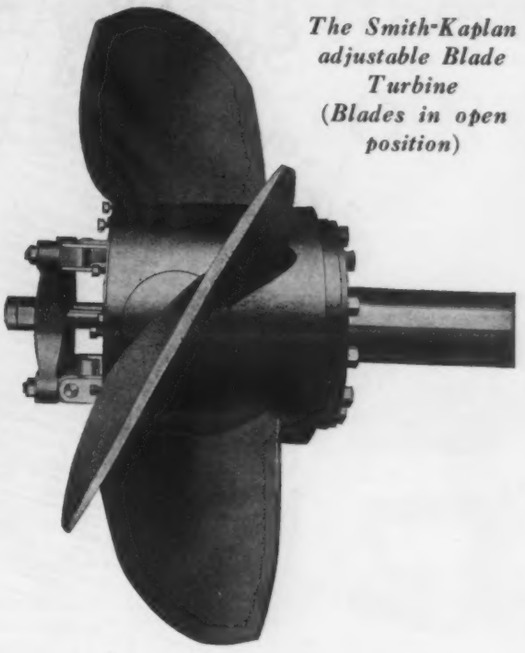
State at 64th St.—Chicago, U. S. A.

Sales Agent for above Manufacturers

Sierra Equipment Corporation

Telephone and Signal Engineering and Equipment

LOS ANGELES SAN FRANCISCO SEATTLE



The Smith-Kaplan adjustable Blade Turbine (Blades in open position)

Now in Successful Operation

The First Kaplan

adjustable Blade Turbine

west of the Rockies!

At the Merced Falls Development of the San Joaquin Light & Power Corporation, Fresno, California—the first KAPLAN ADJUSTABLE BLADE TURBINE west of the Rockies, is now in successful operation.

Under a head of 26 feet, at 128.6 r.p.m., this Kaplan Turbine develops 4,750 h.p. The plant is automatic throughout.

—Because Smith-Kaplan Turbines have high part-load efficiency, and deliver consistent output under variable loads and heads, this type of turbine is best for run-of-river developments. We are sole owners of Kaplan rights in this country and in Canada. Write FOR BULLETIN 123!

HYDRAULIC TURBINES
MORGAN SMITH CO.

YORK, PA.

Boston Chicago Salt Lake City Denver Portland, Ore. San Francisco

Associated Companies:
S. Morgan Smith-Inglis Co., Ltd., Toronto, Canada

Spend 1¢
for electricity
-avoid a cold
These cold mornings while you are dressing or shaving, 1¢ worth of electricity keeps away dangerous chills. So plug in a portable electric heater during your first 20 minutes out of bed—and start the day in healthful comfort.
Mothers like an electric heater for the children's room. It's absolutely safe. It's fine for drying hair. It dries clothes on rainy days. It's nice when you want a little heat when starting the furnace. Or when you come home cold late at night. This type of heater is designed especially for heating the bathroom, breakfast nook or any other small room. No special wiring is needed. Simply plug it into any convenience outlet.
The operating cost for a full hour is but a few cents, for we have a Special Domestic Heating-Cooking Rate.
See the selections of portable electric heaters at our office.
Local dealers also sell Portable Electric Heaters.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians
Like a beam of sunshine
-and just as clean and healthful!
On cold mornings like these—when you jump out of bed—you need quick heat.
The easiest, quickest way to get it is with a portable electric heater.
A cent's worth of electricity used in this heater protects you from dangerous chills, a cold and days of health under par.
This type of electric heater gives a cheerful beam of heat where you want it. It has a heavy base which prevents tipping over. The reflector is made of metal which cleans easily if you splash soapy water upon it.
With our Special Low Domestic Heating-Cooking Rate, one of these heaters chases away chills for a cost of a few cents an hour.
See the selection of portable electric heaters at our office.
The local dealers also sell portable electric heaters.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians

Actual size of these advertisements: Left, 3 col. x 10 in. Right, 3 col. x 11 inches.

Football Seasons May Come and Go
but
Selling Must Go On Forever . . . . .

Therefore, and as an aid to dealers selling portable electric heaters, the Pacific Gas and Electric Company has planned another advertising campaign.

Watch your local newspapers during January 1931 for the appearance of the advertisements reproduced above. Notice how prospective readers are directed to dealer stores.

These advertisements, and others that will follow, are designed to sell *your* prospects and to *increase* the market for portable electric heaters in Northern and Central California.

If you are located in territory served by the P. G. and E., you have a splendid opportunity to draw into your store the prospects created by this newspaper advertising.

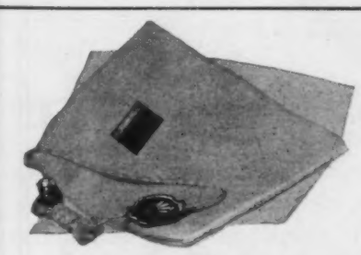
The only tie-in necessary to bring in these prospects is a suitable window display.

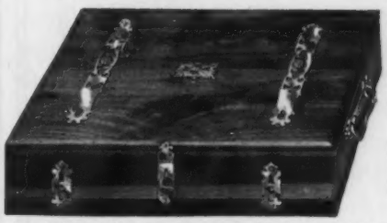
PACIFIC GAS AND ELECTRIC COMPANY

P·G·and E·

Owned·Operated·Managed
by Californians

You can't lose when you play these GENERAL ELECTRIC HOTPOINT Profit-making Specials



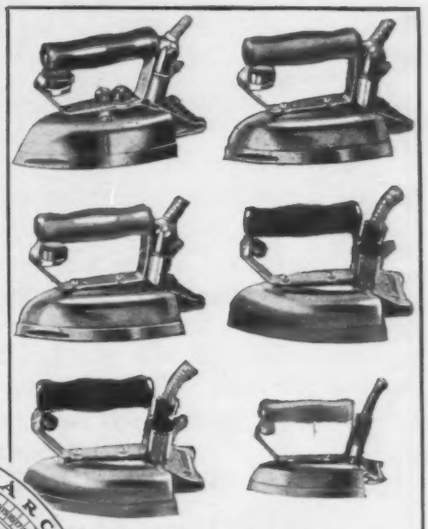


Special combination of General Electric Hotpoint Comfort Heating Pad packed in exquisite Treasure chest of genuine aromatic Tennessee red cedar. Special combination offer good only until April 30, 1931.

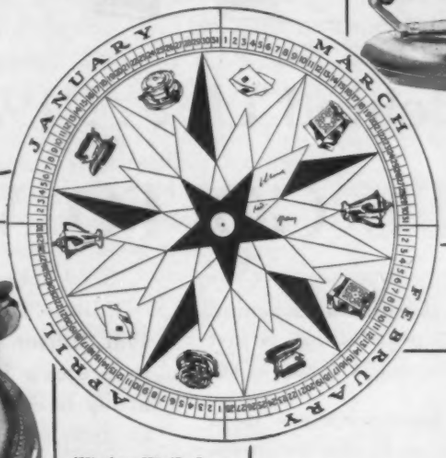
HERE are new General Electric Hotpoint specials that are proved profit-makers for the dealer. You can't lose when you play them. Some of the advantages of the new Hotpoint Campaign items are:

1. Each one carries the name Hotpoint.
2. Quality merchandise of inherent dependability, at attractively low prices.
3. Liberal sales help of positive pulling power.
4. Supported by consistent and intensive national advertising program.

See your Hotpoint representative for full information or write us.



General Electric Hotpoint Iron package containing 2 Model R Irons, 2 Super-Irons, 1 Super-Automatic Iron, 1 Three-pound Iron at special combination price giving you an unusually large profit.



Windsor Waffle Iron in non-tarnishing chromeplate. A $12.50 value at an amazingly low net price. Ask your Hotpoint representative to quote.

The Cambridge Chromeplate Toaster. One operation of knob turns both slices of toast. A $7.00 value at low net price. Ask your Hotpoint representative to quote it to you.

The Vogue six-cup percolator of genuine Hotpoint quality finished in beautiful lustrous, chromeplate. A $12.00 value at low net price to you.

GENERAL ELECTRIC

Hotpoint

Edison General Electric Appliance Co., Inc., 126 D New Montgomery St., San Francisco, Calif.

1930 is Behind Us . . . 1931 is Ahead

LET'S GO TO WORK

1930 with all its weal and woe is behind us; 1931, with all its possibilities, is just ahead. . . and California is ready to go.

Here in Edison territory there is in the making a citrus crop that promises to be as large as the $135,000,000 crop of 1930. Thirty million dollars will be spent by citrus growers in harvesting and marketing this crop. In prospect is a program of public works which probably will surpass in expenditures that of any recent year.

Edison anticipates good business in 1931. Edison has appropriated $28,000,000 to prepare for good business. Edison firmly believes that better business will be felt first by the electrical industry, because it is our job to pave the way.

So we suggest that from this time on we stop thinking 1930 and begin thinking 1931. There's a man-sized job ahead. Let's go to work.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Edison

For the greatest range sales in 1931 use these two sales plans

1. A complete campaign to employes.
2. The most comprehensive campaign to consumers ever offered.

THIS year General Electric Hotpoint presents two electric range selling plans—the first to sell the central station employes, the second to sell the regular consumers. Companies throughout the country have learned the importance of employe ownership as a rock upon which to build their electric range merchandising structures. They have found from experience that employes who own electric ranges —who know the many benefits of them from actual use—can best sell electric ranges.

The General Electric Hotpoint Employes Range Plan Book is based upon a number of successful campaigns of this character. It is a proved successful method of selling ranges just as the regular General Electric Hotpoint Range Selling Plan has been proved for the public.

These two selling plans are available without charge. They give in complete detail, step by step, the proved methods of selling. Beautiful and effective literature and display material, finished in silver and black, are yours for the asking. See your Hotpoint representative for copies of these plans or write us.

Employe range selling is a family affair and this complete year book tells you how to talk to your own family of employes.

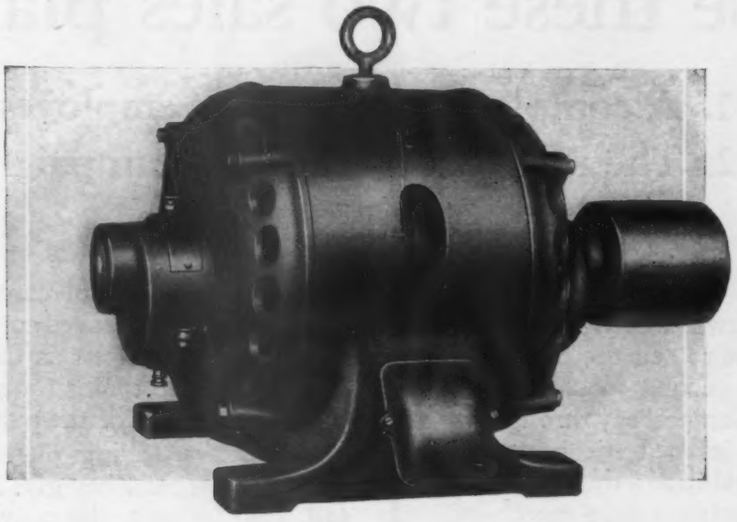
The Consumer Electric Range Selling Plan is better than ever. This card index of activity contains samples of beautiful literature and displays in black and silver, suggested newspaper advertisements, outdoor posters, reprints of national advertising and other material to assure a successful range campaign.

GENERAL ELECTRIC

Hotpoint

EDISON GENERAL ELECTRIC APPLIANCE COMPANY, INC.,
126 D New Montgomery St., San Francisco, Calif.

THEY KEEP A-RUNNING



10 Horse Power Century Type SCN Squirrel Cage Induction 3 and 2 Phase 60 Cycle Motor—Across-the-line-Start.

SIMPLICITY OF STARTING

No current-limiting starting equipment is required on Century Type SCN Squirrel Cage Motors in 30 horse power and smaller sizes, because their starting current is within NELA recommendations . . . Any approved switch or starter may be used. As a result, they take full advantage of the line current—no current is dissipated in starting equipment—installation is simplified and maintenance costs are low.

Century Squirrel Cage motors are built in all standard sizes from ¼ to 250 horse power.

Century 250 Horse Power 60 Cycle 440 Volt 1800 R.P.M. 3-Phase Squirrel Cage Induction Motor.

CENTURY ELECTRIC COMPANY
1806 PINE ST. · · ST. LOUIS, MO.
40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

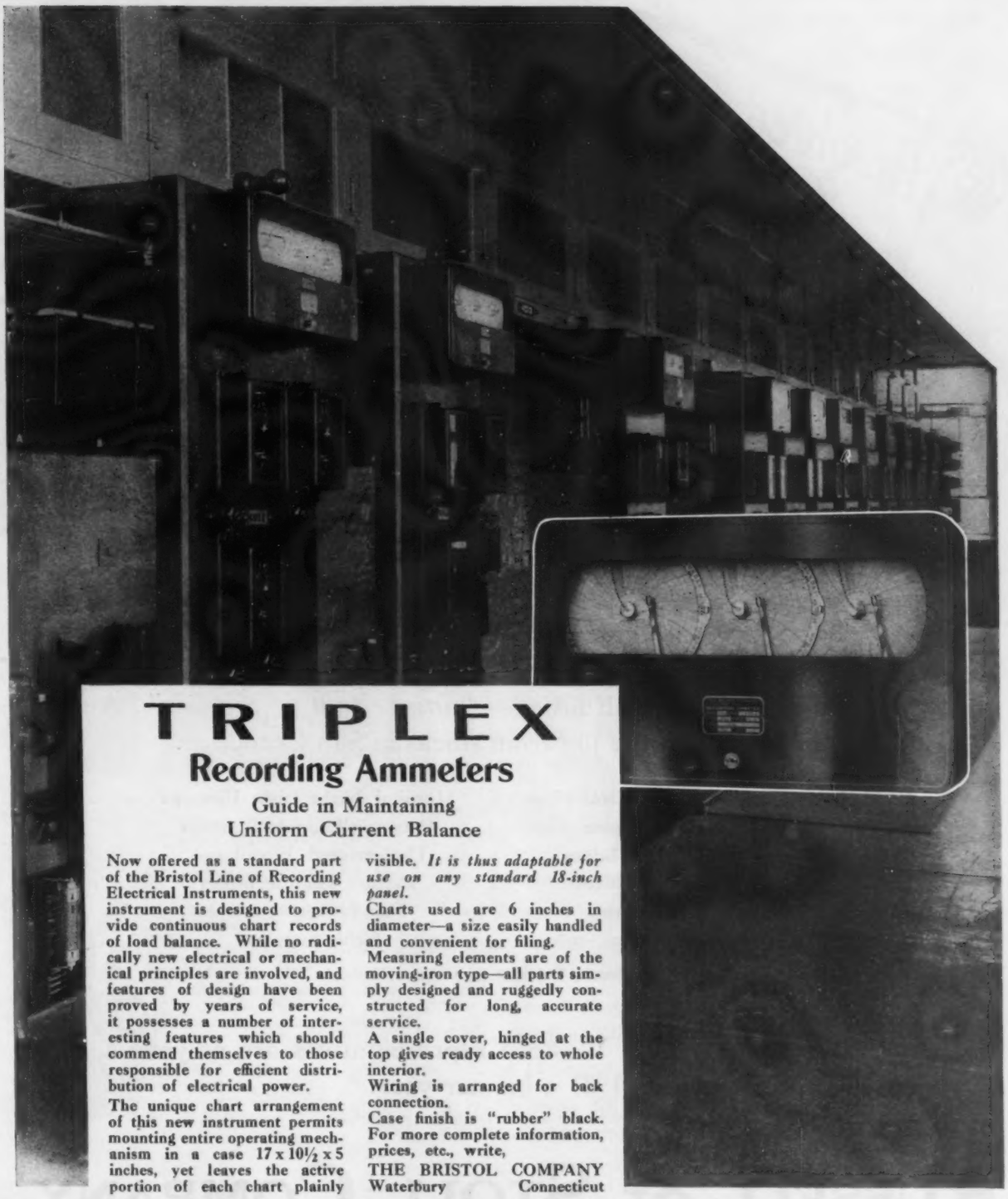
SINGLE PHASE, THREE PHASE, AND DIRECT CURRENT MOTORS

Century MOTORS

MOTOR GENERATOR SETS, ROTARY CONVERTORS, FANS AND VENTILATORS

SCN-1-10

FOR MORE THAN 27 YEARS AT ST. LOUIS



TRIPLEX

Recording Ammeters

Guide in Maintaining Uniform Current Balance

Now offered as a standard part of the Bristol Line of Recording Electrical Instruments, this new instrument is designed to provide continuous chart records of load balance. While no radically new electrical or mechanical principles are involved, and features of design have been proved by years of service, it possesses a number of interesting features which should commend themselves to those responsible for efficient distribution of electrical power.

The unique chart arrangement of this new instrument permits mounting entire operating mechanism in a case 17 x 10½ x 5 inches, yet leaves the active portion of each chart plainly visible. *It is thus adaptable for use on any standard 18-inch panel.*

Charts used are 6 inches in diameter—a size easily handled and convenient for filing.

Measuring elements are of the moving-iron type—all parts simply designed and ruggedly constructed for long, accurate service.

A single cover, hinged at the top gives ready access to whole interior.

Wiring is arranged for back connection.

Case finish is "rubber" black.

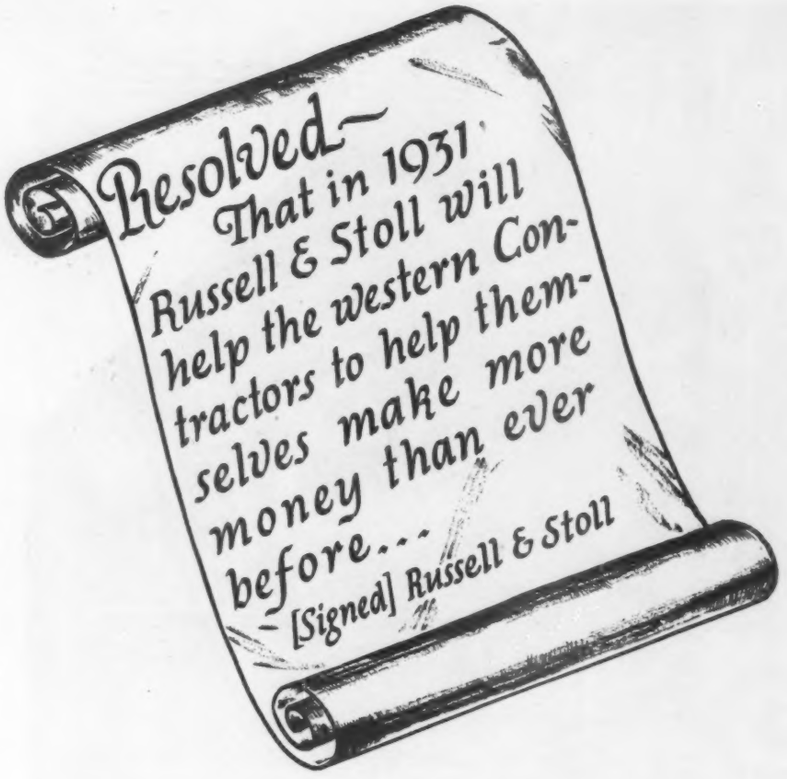
For more complete information, prices, etc., write,

THE BRISTOL COMPANY
Waterbury Connecticut

BRISTOL'S

SINCE 1889

Instruments *for* Indicating Recording Controlling



By installing Russell & Stoll fittings—*"fittings that fit the job."* And also by getting them on the job from stocks in San Francisco.

Heavy-Duty Receptacles and Plugs	Hospital Night Light Fixtures
Underfloor Duct Extension Sets	Fountain Lighting Fixtures
Watertight Junction Boxes	Underwater Floodlights
Watertight Panel Boxes	Fixture Hanger Boxes
Vaporproof Fixtures	Fan Hanger Outlets
Marquise Fixtures	Cable Supports

Floor Boxes, Outlets and Accessories

Russell & Stoll Company Western representatives are at your service to aid you in making 1931 a banner year.

RUSSELL & STOLL COMPANY

53 Rose Street, New York, N. Y.

Pacific Coast Representatives

H. M. THOMAS CO.
163 2nd Street
San Francisco, Calif.

L. W. THOMPSON
912 E. 3rd Street
Los Angeles, Calif.

"FITTINGS THAT FIT THE JOB"

THE IMPORTANT FRACTIONAL %

Shown above is the Leila Y Post Montgomery Hospital, Battle Creek, Michigan in which Hazacord wire was used.

Schmidt, Garden & Erickson, Architects

R. E. Phelps Construction Co., Gen. Contr.

Guarantee Electric Construction Co., Elec. Contr.

Insulated wire comprises only a fraction of one % of the total cost of a public building. It is one of the few building materials which deteriorates with age. Obviously, it pays handsomely to use a quality of insulated wire which will age slowly, thus putting off the time when replacement of circuits becomes necessary.

In the manufacture of Hazacode Building Wire only NEW Hevea rubber is mixed with chemically pure fillers to make the insulating compound. This use of new rubber, instead of reclaimed rubber or rubber substitutes, accounts for the superior resistance of Hazard Wires and cables to the deteriorating effects of time. It explains why so many conservative architects and builders *specify* it for use in their important jobs.

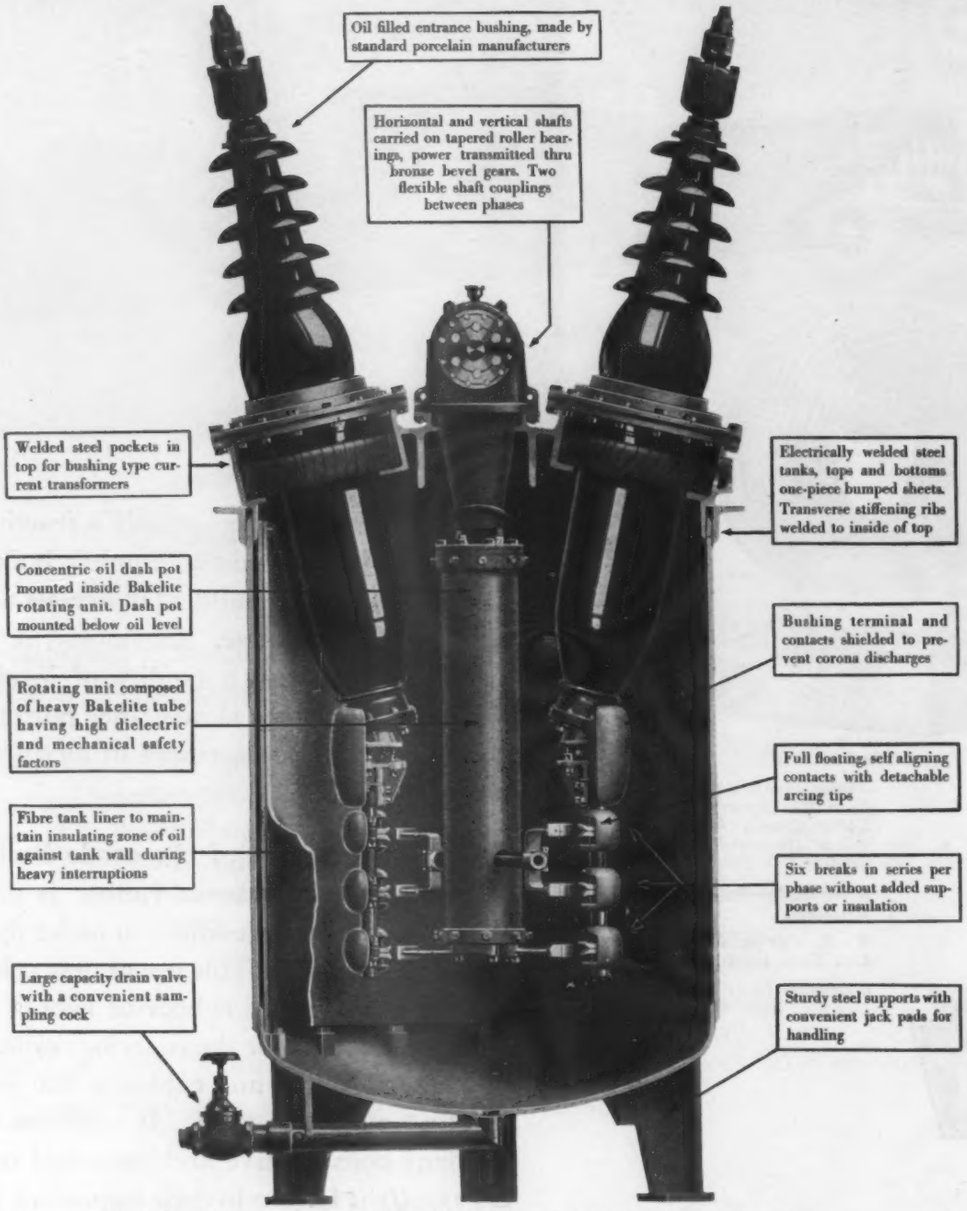
HAZARD INSULATED WIRE WORKS

Division of The Okonite Company

WORKS: WILKES-BARRE, PA.

NEW YORK	CHICAGO	PHILADELPHIA	PITTSBURGH	ST. LOUIS	BOSTON
ATLANTA	BIRMINGHAM	SAN FRANCISCO	LOS ANGELES	SEATTLE	DALLAS

PACIFIC ELECTRIC MULTIPLE BREAK OIL CIRCUIT BREAKERS


Oil filled entrance bushing, made by standard porcelain manufacturers
Horizontal and vertical shafts carried on tapered roller bearings, power transmitted thru bronze bevel gears. Two flexible shaft couplings between phases
Welded steel pockets in top for bushing type current transformers
Electrically welded steel tanks, tops and bottoms one-piece bumped sheets. Transverse stiffening ribs welded to inside of top
Concentric oil dash pot mounted inside Bakelite rotating unit. Dash pot mounted below oil level
Bushing terminal and contacts shielded to prevent corona discharges
Rotating unit composed of heavy Bakelite tube having high dielectric and mechanical safety factors
Full floating, self aligning contacts with detachable arcing tips
Fibre tank liner to maintain insulating zone of oil against tank wall during heavy interruptions
Six breaks in series per phase without added supports or insulation
Large capacity drain valve with a convenient sampling cock
Sturdy steel supports with convenient jack pads for handling

Pacific Electric Type RW Floor Mounted Oil Circuit Breaker

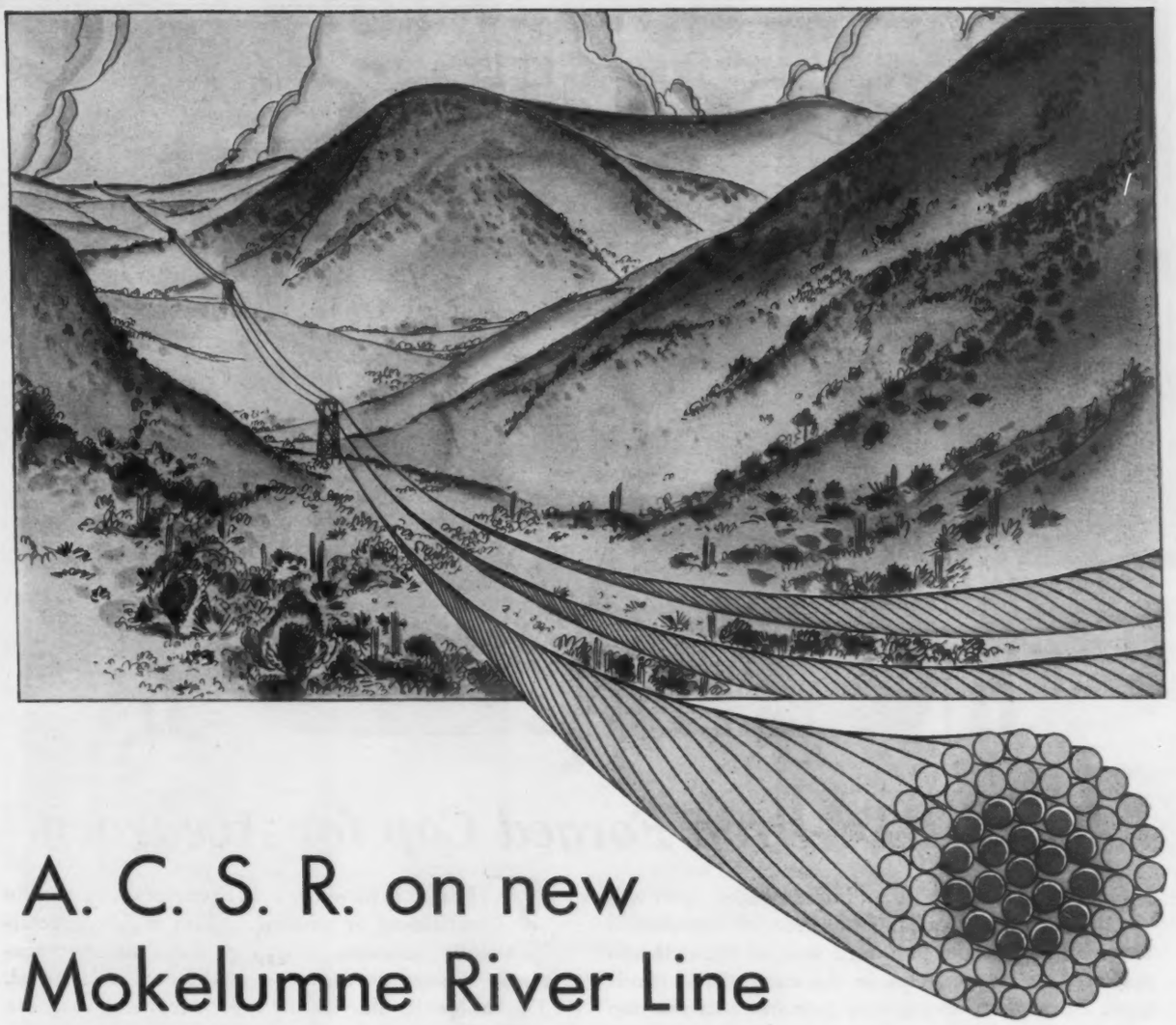
Pacific Electric Manufacturing Corp.

Bay View, San Francisco. Calif.

30 Church St., New York City
Allen Building, Dallas, Texas
H. W. Hellman Bldg., Los Angeles, Calif.
Liggett Building, Seattle, Wash.
89 Broad St., Boston, Mass.

Dunes Highway, Gary, Indiana

1700 Sansom St., Philadelphia, Pa.
Dwight Building, Kansas City, Mo.
Symes Building, Denver, Colo.
Plymouth Bldg., Minneapolis, Minn.
P. O. Box 263, Phoenix, Ariz.
Bedell Building, Portland, Ore.



A. C. S. R. on new Mokelumne River Line

P. G. and E. looked at the A.C.S.R. on their 220,000 volt Pitt River Line and then ordered 170 miles for their new Mokelumne River Line.

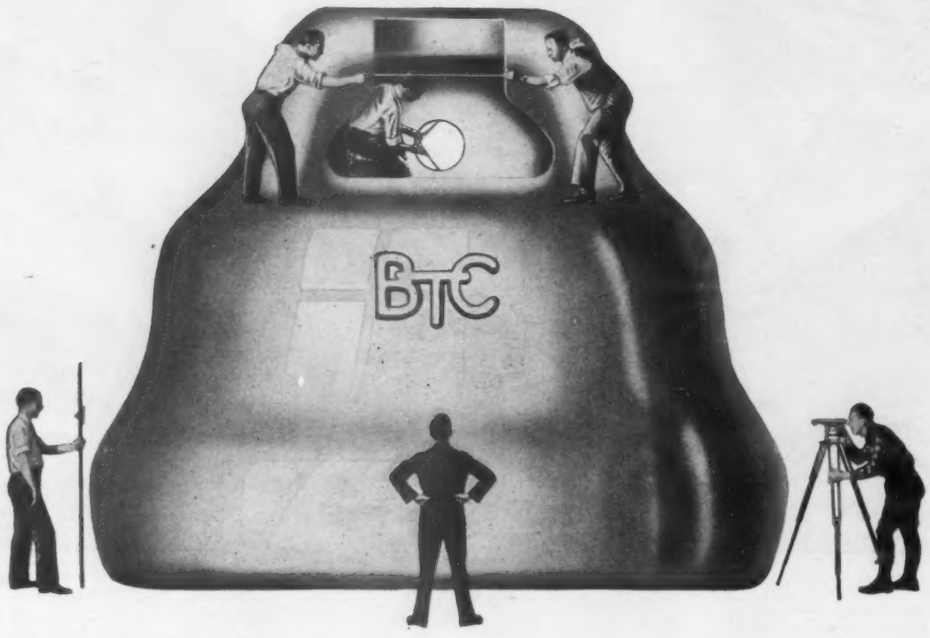
It is interesting to know that Pacific Gas & Electric Company, after ten years of successful experience with aluminum cable, steel reinforced, (A.C.S.R.) on the mountainous section of their Pitt River Line, have again specified 1 in. diameter A.C.S.R. for similar duty. 170 miles of this material is now being used in the construction of their 220,000 volt Mokelumne River Line through the mountainous region of California, in the section where ice and wind loading is most severe and transportation and erection of the transmission line most difficult.

A representative will be glad to call and discuss the advantages of A.C.S.R. for any installation that you may have in mind. Address ALUMINUM COMPANY *of* AMERICA; 2431 Oliver Building, PITTSBURGH, PENNSYLVANIA.

Far Western Offices: Western Pacific Bldg., 1031 S. Broadway, Los Angeles, Calif.—709 Rialto Bldg., San Francisco, Calif.

ALCOA ALUMINUM

Accuracy



Test a BTC Drop Forged Cap for Accuracy

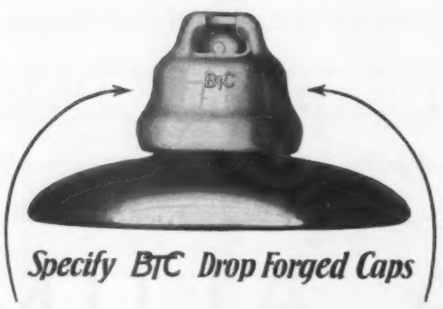
PLACE them on go and no-go gages—you will be surprised at the absence of egg-shaped caps. Examine the ball stud seat of the ball and socket type or the holes in the ears of the clevis type. Test them every way possible and you too will be thoroughly convinced that in addition to strength, uniformity of metal and the anti-corrosive feature, BTC drop forged caps for high tension suspension insulators offer minimum varience in dimensions.

THERE is no process so accurate as automatic machining or drilling. With highly specialized full automatic machines built to specifications, a smooth uniform stud seat is assured. The holes in the clevis type ears are machine drilled from the solid ear giving absolute uniformity and insuring an equal pull on both ears. Where uniformity is vital to strength, no engineer will deny the superiority of machined accuracy.

Manufactured by

The Brewer-Titchener Corporation

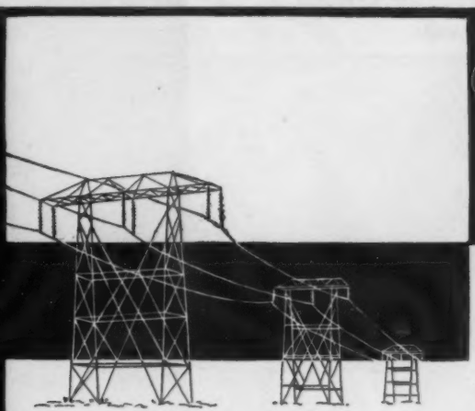
Cortland, New York

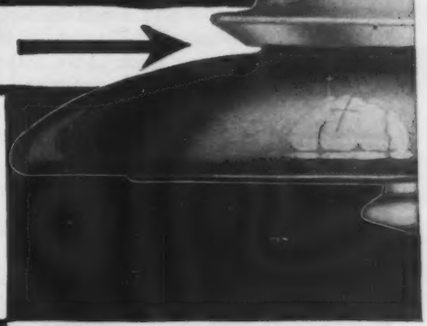


Specify BTC Drop Forged Caps

PREVENTING DESTRUCTIVE STRESSES *with the*

GASKET ASSEMBLY →





Seven Keys to Value

1. The Tell-Tale Color Glaze
2. Short Spaced Units
3. The Gasket Assembly
4. The Beaded Cap Design
5. The Sanded Surface
6. Treated Sanded Surface Joints
7. The Resilient Steel Pin

THE METAL CAP of a suspension insulator unit, when in actual contact with the top of the porcelain disc, can and does impose destructive forces on the porcelain. This "frozen" assembly, characteristic of suspension units of 1910 and 1911, failed to provide the relief necessary to compensate for the greater relative expansion of the metal caused by temperature changes.

First efforts to relieve this condition were incorporated in O-B Suspension Insulators in 1912. A gasket was inserted between the edge of the cap and the porcelain. It provided ample clearance between metal and porcelain at this point and eliminated the development of stresses due to temperature changes.

The result of this simple, yet important change, was effectively demonstrated by a remarkable performance of the first line equipped with insulators embodying this refinement. This line functioned without interruption for twenty-two months, an unexpected record. It so effectively demonstrated the advantage of the gasket assembly that it has become a standard assembly practice for all cap and pin type suspension insulators.

Look for the Gasket Assembly, make sure that you get it, for it is one of the important *Seven Keys to Value.* When you are seeking it, you may wish to bear in mind the fact that O-B discovered the need and first provided the Gasket Assembly in 1912.

1307H

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Company, Limited
Niagara Falls, Canada

215 Market St.
San Francisco

1218 Third Ave.
Seattle

417 So. Hill St.
Los Angeles

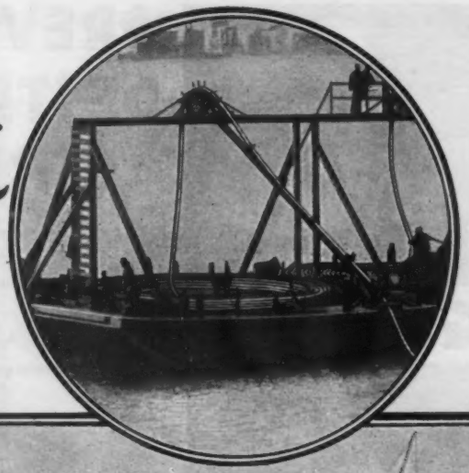
Ohio Brass Co.

NEW YORK PITTSBURGH
PHILADELPHIA BOSTON

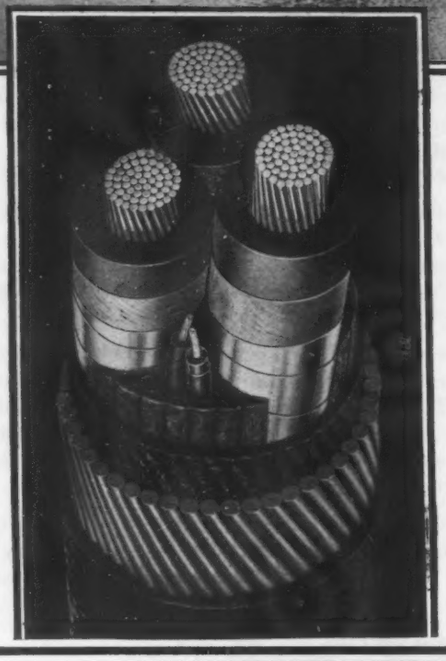
CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Achievement
in Submarine Cables



Laying parallel and simultaneously three Submarine Cables across the Mississippi River at Davenport, Iowa, for the Peoples Power Company. Each Cable of the leadless three conductor type, four inches in diameter and one mile in length, operating at 15,000 volts.



THE development of submarine cables to meet every need—to render far longer service and assure the greatest efficiency of transmission—has been the constant aim of the American Steel & Wire Company.

Back of these outstanding products are years of wire making experience—and this is apparent in superior engineering service—reasonable cost, and proved quality.

No matter what your electrical problem may be—whether you need standard or special cables for submarine, overhead or underground use, you will find us ready to serve you efficiently and economically. We make cables in any quantity, of any size or type and for any voltage, to meet the most rigid specifications.

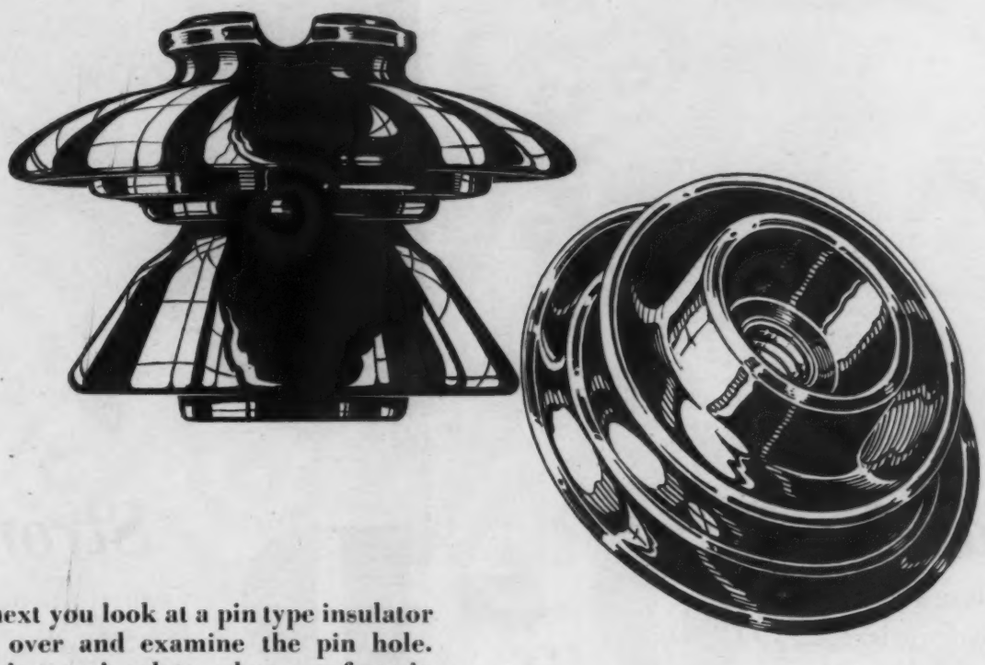
AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

PACIFIC COAST DISTRIBUTORS

COLUMBIA STEEL COMPANY

SAN FRANCISCO LOS ANGELES PORTLAND SEATTLE HONOLULU



When next you look at a pin type insulator turn it over and examine the pin hole. Locke pin type insulators have perfect pin holes because they are metal threaded. This metal thread not only raises the corona point of the insulator but by eliminating the imperfections always found in the old porcelain threaded type allows a sturdier, less expensive pin to be used. Construction men appreciate the ease of assembly and the reduction in time, labor and consequently in expense afforded by this advanced design.

Locke pin type insulators and Locke Redhead or Leadhead pins form a perfect combination. Specify them for your next line and you will find out why other transmission engineers have so enthusiastically adopted them.

GENERAL ELECTRIC SUPPLY CORPORATION
Distributors for the Pacific Coast

LOCKE PORCELAIN INSULATORS

There Is No Other Insulator Like It!

Massive

The latest J-D Dead-End insulator is really massive. It is so thick and rugged that even if the skirts are shattered the insulating value is but slightly impaired.

J-D
Dead-End Insulator

Strong

Look at the picture—the body is so thick that the tensile strength is 50% to 100% greater than units now used for this purpose. The mechanical strength remains even when the skirts are shattered.

It is designed to meet a long felt need.

These units used singly or in combination have universal application to distribution or low voltage work and have been adopted as standard by some of the largest utilities.

Jeffery-Dewitt Insulator Co.
Kenova, W. Va.

PACIFIC COAST AGENCIES

Garland-Affolter Engineering Corp., I. W. Hellman Bldg., Los Angeles, Calif.
Garland-Affolter Engineering Corp., Rialto Bldg., San Francisco, Calif.
Garland-Affolter Engineering Corp., Alaska Bldg., Seattle, Wash.
Westinghouse Electric Supply Co., South 152 Monroe St., Spokane, Wash.
L. Brandenberger, 149 West 2nd South, Salt Lake City, Utah.
A. F. Krippner, 1429 18th St., Denver, Colorado.

One of our 12 modern mills—the Hastings-on-Hudson plant which produces Anaconda paper lead power cable

As Advanced as the New Year

. . . Super-Treated Insulation in paper lead power cable

WE have the same complete facilities in our several factories for the manufacture of

VARNISHED CAMBRIC

—Lead Covered, or
—Braid Covered

and of

RUBBER

—Lead Covered, or
—Braid Covered

●

For the manufacture of paper insulated lead sheathed power cable, Anaconda enjoys the exclusive use in this country of the patented Taylor process.

Special equipment of Anaconda design preheats the cable . . . removes the moisture from the paper insulation . . . deaerates and dehydrates the oil completely . . . and impregnates the cable at vacua *within one mm. of absolute.*

This new impregnating process, based on Johns Hopkins and Harvard research, includes a "closed" oil and cable treatment system. It is as modern, as advanced, as new as the New Year!

ANACONDA WIRE & CABLE COMPANY

General Offices: 25 Broadway, New York

Pacific Coast Offices: Los Angeles, San Francisco, Seattle

Pacific Coast selling agents for Bare and Weather-proof Wire and Power Cable: General Electric Supply Corporation.

Ex-Divot Diggers *know*

the worth of business papers

"LAST year I got a healthy tan digging divots. This year I've acquired a Pullman pallor digging for business. And let me tell you: this year I realize the dollars-and-cents value of my business papers."

You'll hear the same story from business executives the country over, in every line of industry or trade—yes, and from professional men too. These are the times that try the worth of every business thing. And from the welter of work and worry the business paper emerges with firmer friends and a brighter prestige than ever before.

For the business paper is one institution which, without fuss or feathers, goes quietly about its work of telling how to do a better job. And the business concern of today is up against the problem of doing a better job or going to the wall under pressure of competition.

Hence the greater appreciation of business papers among business men—evidenced by a closer study of their pages and an increased use of the data that business papers bring. Hence the marked confidence in the leadership of business papers—shown by a readiness to follow their lead in the turmoil of changed conditions.

Hence, too, the reliance upon the business paper as a primary advertising medium, indispensable for reaching industry, trade or profession—attested by a notable steadiness of business paper advertising volume.

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods, and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

This publication is a member of the Associated Business Papers, Inc. . . . a cooperative, non-profit organization of leading publications in the industrial, professional and merchandising fields, mutually pledged to uphold the highest editorial, journalistic and advertising standards.

+ + +

THE ASSOCIATED BUSINESS PAPERS, INC.
TWO-NINETY-FIVE MADISON AVENUE · NEW YORK CITY

Starter "life insurance" in a new form

Close-up of contacts. Note coin-silver tips rolled into contact bars.

CONTACTORS and a contact-mechanism which are almost imperishable assure hitherto unheard-of long life, in the C-H 9586 "AAA" Twin Break Starter for motors up to 7½ h.p.* The contactors are unaffected by oxidation; do not bounce, burn or weld; sustain practically no mechanical wear. A test equal to years and years of the most exacting service showed the contactors still good for millions of operations.

The C-H "AAA" Twin Break Starter has been unusually simplified, and all parts strengthened accordingly. Many other features contribute to the unique performance of this starter.

The C-H "AAA" Twin Break Starter is typical of the superiority of the entire line of C-H Motor Control. As a built-in part of motor-driven machinery, it betters the performance of the machine. It is evidence the builder of the machine knew well the buyer's requirements of accurate protection to motors so production may move at top speed; of freedom from maintenance so production may move unhampered; of the maximum saving of time and steps.

Investigate C-H Motor Control thoroughly . . . look for it on the machines you buy—stocked by electrical wholesalers in principal centers.

*440-550 Volts

Features of C-H 9586 "AAA" Starter

1 Heavy coin-silver contacts. Oxidation cannot hamper current-carrying capacity. Operate on severest inching service at maximum h. p.

2 Silver contact-structure insures cool operation under continuous current. Carries rated current with less than half permissible temperature rise.

3 Heavy immovable Thermoplax contact-pockets "soak up" and smother arc. No flash-over even on 25 h.p. stalled motor.

4 Double-make and double-break contacts halve the arc voltage.

5 C-H Overload Relay provides absolute protection, maximum production. To change current-rating and type of motor simply change heater coil.

6 Magnetic latch holds contacts out until starter-button is pushed. Jerking or jarring cannot close contacts.

7 60 fewer parts. No pigtails to break. Starter sturdier, more rugged, has tremendous reserve.

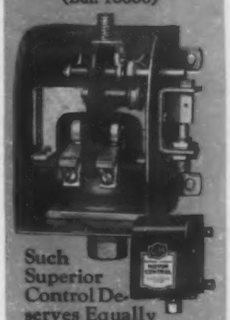
8 Easy to wire. Convenient wiring channel between case and moulded insulation. All leads brought in top or bottom without crowding.

9 *Loosening* one screw dismounts entire control-panel. All parts easily accessible and demountable.

10 Minimum number of current-carrying joints in the circuit. Exceptionally low contact resistance. Very low voltage drop between terminals.

CUTLER-HAMMER, Inc.
Pioneer Manufacturers of Electric Control Apparatus
1278 St. Paul Avenue
MILWAUKEE, WISCONSIN
Pacific Coast Offices:
970 Folsom St., San Francisco
560 S. San Pedro St., Los Angeles
2207 First Ave., So., Seattle

C-H Pressure Regulator (Bul. 10006)



Such Superior Control Deserves Equally Superior Accessories

Accessories play far too important a part in production for their selection to be left to chance. A safeguard to equipment, an essential in automatic operation, a time-saver and convenience, "righthand man" to the main Control . . . they *must* be dependable, long-lived and immune to trouble.

Realizing this, Cutler-Hammer Engineers have developed *all* C-H Accessories along with, and as a part of, C-H Motor Control . . . its equal in every way; in design, in engineering, in quality of materials and care in manufacture. You will find that the necessary penalties paid by all moving mechanisms are reduced to a minimum in C-H Accessories.

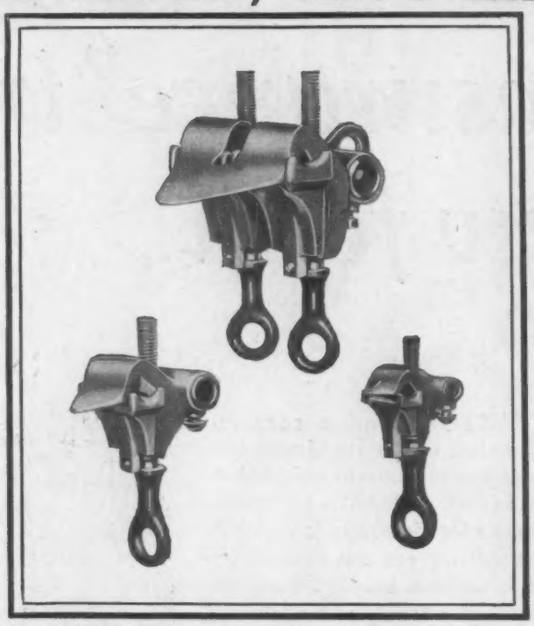
C-H Limit Switches (Bul. 1271)

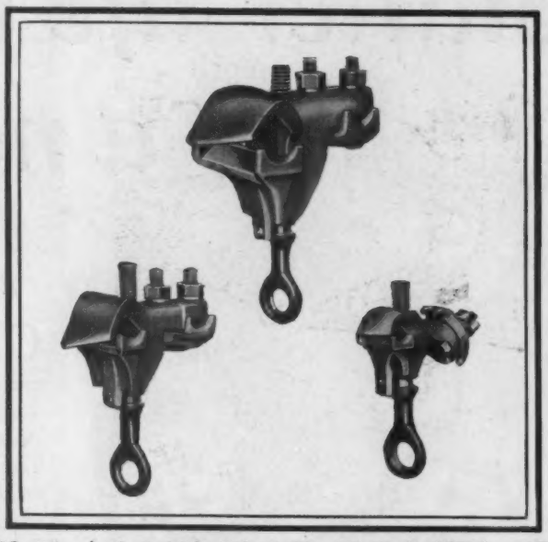
CUTLER HAMMER

The Control Equipment Good Electric Motors Deserve

A-3913

Kearney Live Line Tap-Off Clamps





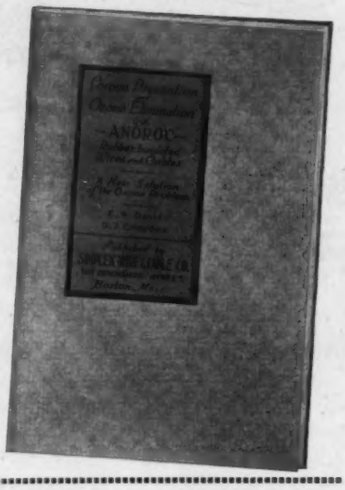
POSITIVE THREE POINT SELF ALIGNING CONTACTS

MAYDWELL & HARTZELL
INCORPORATED

San Francisco Los Angeles Seattle

FACTORY DISTRIBUTORS OF JAMES R. KEARNEY CORPORATION PRODUCTS

Corona Prevention and Ozone Elimination
with
TRADE **ANOROC** MARK
Rubber Insulated Wires and Cables



"Corona Prevention and Ozone Elimination with Anoroc Rubber Insulated Wires and Cables" is a new and interesting 20 page booklet containing description of tests and giving data on the latest Simplex product, Anoroc Rubber Insulation for high voltage wires and cables.

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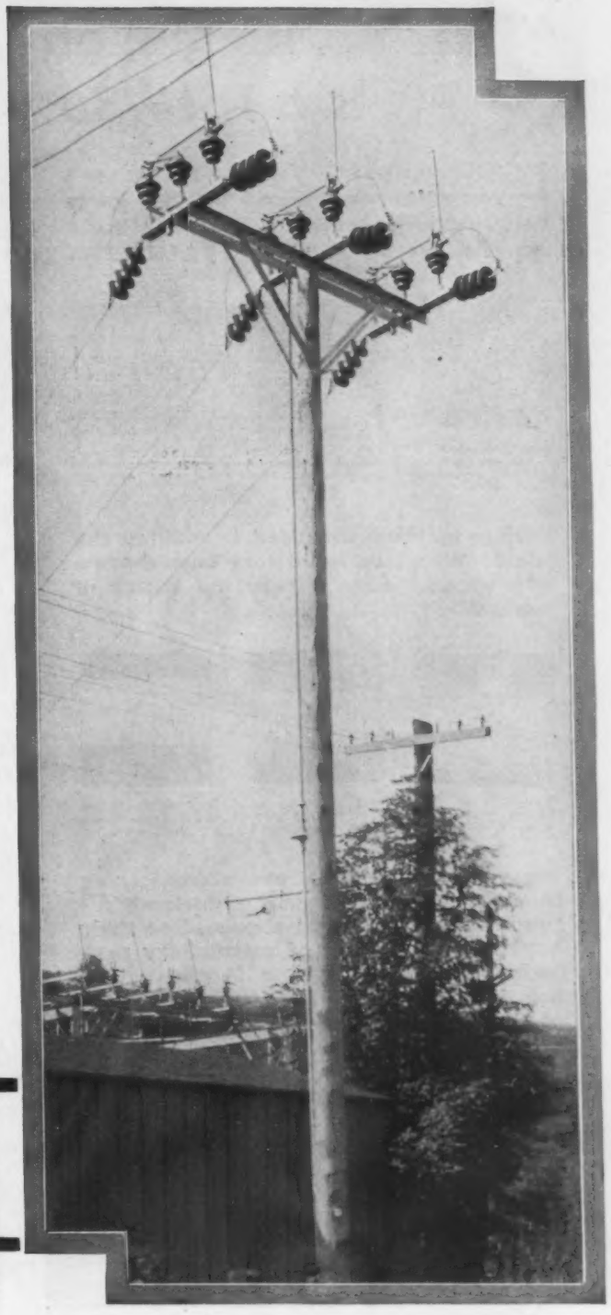

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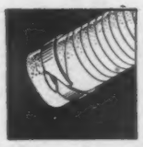
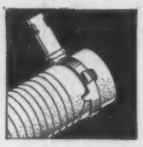
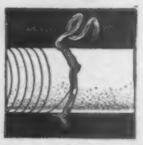


Here are shown 6 of the methods for fastening resistance wire

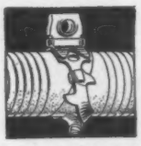


To the terminal connection. As would be supposed, ONE method

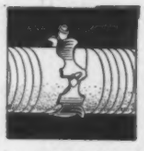


Cannot meet all needs. This is logical when wire and

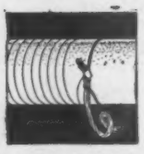
Various methods are used in making the joints. Wire size, refractory base characteristics and duty dictate the choice of methods.



Terminal sizes and shapes are considered. Whether a



Joint shall be of the pressure type, brazed, or soldered



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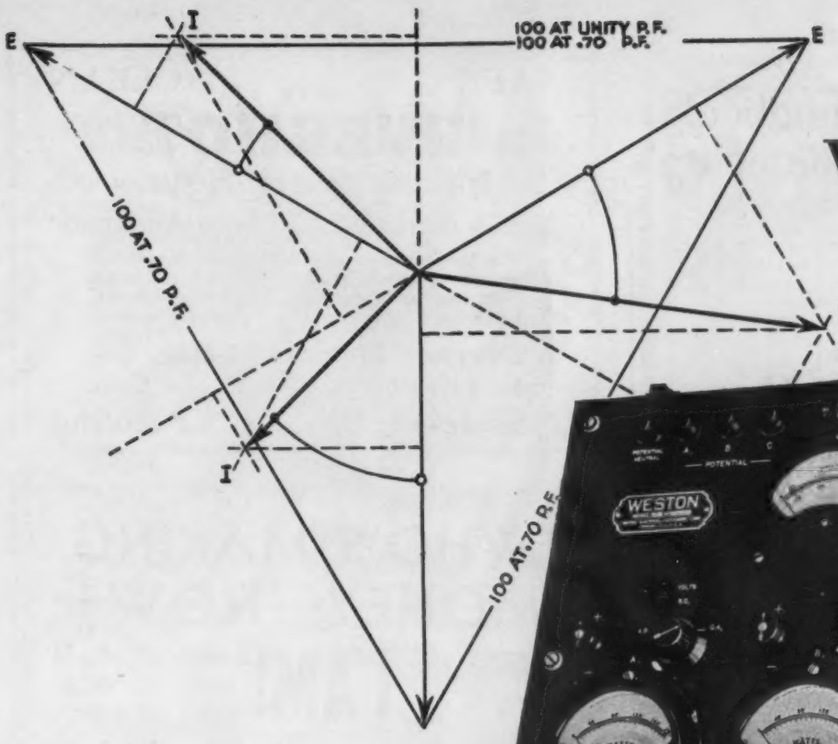

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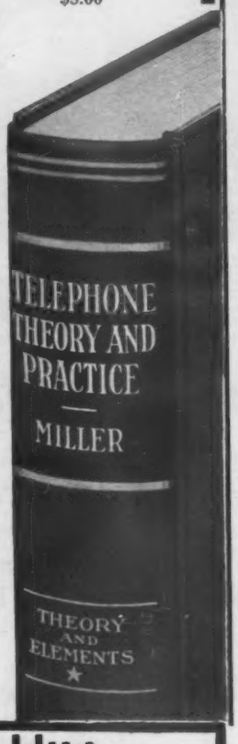

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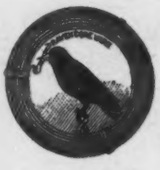

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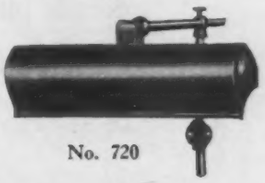

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TIME and again the electrical industry has proved that it is ruled less by tradition and more by ideas than any other group. Take this idea for what it is worth.

THE SLUMP in trade has not been as great on the Pacific Coast as elsewhere in the United States. Depression on the West Coast has been sympathetic. With the dawn of 1931 it should be cast aside like last year's calendar.

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R-3309-S Engineer, mechanical or electrical, not over 30 years, with 3 to 5 years experience on hydro-electric plant operation for service and testing work. Must have mechanical skill, agreeable personality and be willing to travel. Salary $175 month and expenses in the field. Apply by letter. Headquarters, San Francisco.

W-119 Assistant Editor, graduate, mechanical engineer with practical experience in steam refrigeration, maintenance and plant engineering. Salary $2500 a year. Apply by letter. Location, South.

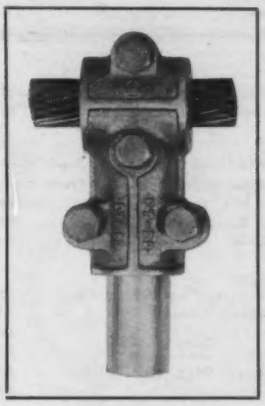
X-6900-S Electrical Engineer to design and sell transmission lines. Apply only by letter. Salary $5000 a year. Location, East.

POSTSCRIPT

Employmentally speaking, this is the quietest month in the quietest year. Whether the nation-wide effort to stimulate employment will change old habits and start the wheels of industry turning in January instead of April is impossible to predict. All we know is that a new year is coming and some good must come with it to those who keep their courage, their zest for life and their friends.

HAPPY NEW YEAR

Cast-to-Size Solderless Connectors



Unit Type "F" solderless connector

This connector is the result of a long development, under careful research and experience, in the design of tubular bus connectors. It embodies two important changes from the general run of connector design. The first has to do with the nature of the contact surface; the second with the material used. See Bulletin 38-F for complete data.

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Wiremold Co., The 60

Pessimism has outlived its usefulness • • •

The time for pessimism was eighteen months ago. Optimism should be the order of the day.

■ ■ ■

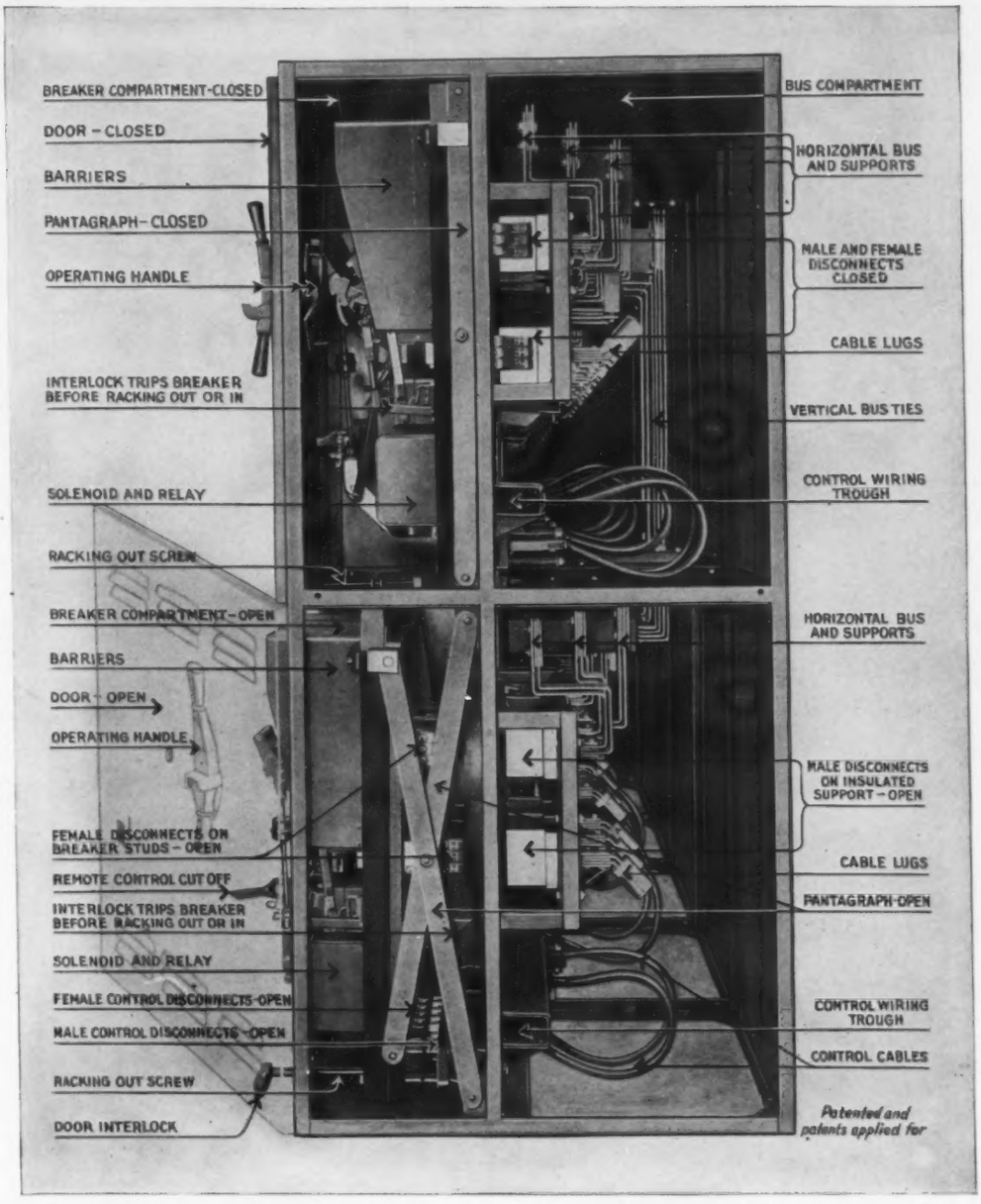
Exceptional executives, instead of merely poring over business curves and spotting the charts with sad, unhelpful tears, undertake to make the curves point upward. They make gloom give way to rational thinking.

■ ■ ■

Now is the time to throw one's hat into the Western Business Ring and ELECTRICAL WEST is the place to announce that fact.

The Inside Story of the Multumite

"The World's Largest Builders of Air-Type Circuit Breakers"



"The World's Largest Builders of Air-Type Circuit Breakers"

This is a Multumite-Hingite group mounting ten solenoid operated U-Re-Lites of 1250 amperes capacity at 440 volts, 3 phase, 60 cycles. Multumite groups are also made without the double disconnects (Rigite construction) and with hand operated U-Re-Lites mounted from two to six high, according to capacity.

Get in touch with our nearest representative for data on a Multumite group to meet your requirements.

I-T-E CIRCUIT BREAKER COMPANY, 19th and HAMILTON STS., PHILADELPHIA

Birmingham, Crawford Bldg.; **Boston,** 201 Devonshire; **Buffalo,** Ellicott Sq. Bldg.; **Chicago,** 333 N. Michigan Ave.; **Cincinnati,** Union Trust Bldg.; **Cleveland,** Terminal Tower Bldg.; **Dallas,** Burt Bldg.; **Denver,** Tramway Bldg.; **Detroit,** Penobscot Bldg.; **Duluth,** Providence Bldg.; **Kansas City,** Midland Bldg.; **Los Angeles,** 106 W. 3rd; **Minneapolis,** Plymouth Bldg.; **Montreal,** 151 Lagauchetiere St. West; **New Orleans,** 708 Girod St.; **New York,** 12 E. 41st St.; **Omaha,** Electric Bldg.; **Philadelphia,** 1505 Race; **Pittsburgh,** Grant Bldg.; **St. Louis,** Bank of Commerce Bldg.; **San Francisco,** Call Bldg.; **Seattle,** 802 33rd Ave.; **Toronto,** 149 Adelaide St. E; **Vancouver,** 500 Beatty Street; **Winnipeg,** National Cartage Office Bldg.

I-T-E PROTECTION

U-RE-LITES ~ ~ I-T-E CIRCUIT BREAKERS

"ELECTRICITY *costs so little* IN CALIFORNIA"

Forward P. C. E. A.

---we will keep pace!

YOUR Electrical Bureau recognizes the fact that the need for co-operative educational effort directed to the consumer, the architect, and the builder is as great, or even greater today than when the Bureau was first conceived a decade ago.

The scope of the Bureau activities for 1931 is to be announced shortly, embracing plans which will provide for unification of effort in the industry.

Your opportunity to share in these activities will be in proportion to the regard with which you hold the progress of the industry and the time and effort which you may be in a position to devote to further establishment of an impartial service of *responsible helpfulness* to all users of electricity.

Pacific Coast

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A non-profit organization supported by all branches of the industry as an advisory bureau to impartially serve all users of electricity

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